PROPOSALS BY CANADA

ITU REGIONAL ADMINISTRATIVE CONFERENCE
FOR THE PLANNING OF THE BROADCASTING-SATELLITE
SERVICE IN REGION 2 (GENEVA, 1983)

OTTAWA

MARCH 1983

CANADIAN PROPOSALS

Table of Contents

PART 1 - General Considerations

Section 1 - Introduction

Section 2 - Requirements

Section 3 - Planning Approach

Section 4 - Division of the band 12.1-12.3 GHz

Section 5 - Administrative Regulations (introduction)

Section 6 - Technical considerations (introduction)

PART II - Administrative Regulations

Section 1 - Proposed changes to Appendix 30 of the Radio Regulations

Section 2 - Proposed new Appendix 30A for feeder links to the broadcasting-satellite service in Region 2

Section 3 - Proposed amendments to Articles 8, 11, 13 and 15 of the Radio Regulations - Addition of a new Article 15A

PART III - Technical Proposals

Section 1 - Introduction to the technical proposals

Section 2 - Modified technical annexes to Appendix 30 for Region 2

Section 3 - Technical annexes for Appendix 30A

PART IV - Resolutions

Note: The editorial presentation used herein is in accordance with the guidelines prepared by the General Secretariat as shown in Circular Letter No. 1462-RE/CONF/2-1 dated March 4, 1981.

PROPOSALS BY CANADA

For the ITU Regional Administrative Radio Conference for the Detailed Planning of the Broadcasting Satellite Service in the 12 GHz Band and Associated Feeder Links in Region 2

Part I - General Considerations

1. Introduction

Canada is the largest country in Region 2, extending across five major time zones from 53°W.L. to 142°W.L. The Canadian broadcasting system provides national services in both official languages (English and French), as well as regional services to several minority cultural and language groups across the country. Almost all Canadians have access to at least one radio or television signal. However, there is a wide disparity between the availability of broadcasting services in the large urban areas of Southern Canada and rural and remote communities elsewhere in the country. Although the vast majority of Canadians live within 200 km of the Canada-USA border, the remainder live in small communities extending over an area of approximately 8 million square kilometres. Until the development of satellite communications, this disparity seemed to be a permanent fact of life since the populated communities are small and widely dispersed and adequate telecommunication facilities were extremely expensive to implement. The need to provide better telecommunication services to its vast territory made Canada one of the first countries to establish a satellite communications system. The ANIK satellite system, first introduced in December 1972, is now well established with operations in both the 4/6 and 14/12 GHz bands and distributes several television and radio network programs across the country.

The prospect of direct broadcast satellites (DBS) has sparked new interest in the provision of new broadcasting services to individual homes in response to various regional, cultural and social requirements. DBS also will provide the means to eliminate the imbalance which exists in the availability of broadcasting services between Northern and the Southern areas and, within regions, between the metropolitan and rural areas. During the 1970s, Canada embarked on several experimental DBS projects, first with the Hermes satellite and then ANIK B, using the 14/12 GHz band. These experiments have provided much information on the types of systems required and their operational characteristics. The results of these experimental projects together with further multidisciplinary studies have provided the basis for the preparation of Canada's proposals to the RARC-83.

2. Requirements

The Canadian requirements for DBS services within a Regional plan were submitted to the IFRB on June 18, 1982 and they form an integral part of these proposals.

Canada's national broadcasting system provides services in Canada's two official languages (English and French) and includes both a government-supported public broadcasting system and several private advertiser-supported systems. Educational broadcasting systems operate in several provinces, and multilingual broadcasting has been introduced in several parts of the country. Recently

several national and regional subscriber-supported services and other specialized programming services have been introduced. The requirements of these services, as well as new services now being developed in all parts of Canada, are ideally suited to direct-to-home broadcasting by satellite. To satisfy these needs at least 32 channels will be required in each of six service areas, with six orbital positions, each west of its respective service area.

In implementing this system, present plans are to first develop interim systems using two or three orbit positions west of their respective service areas. The complete system would develop as resources become available.

3. Planning Approach

The planning approach to be used at RARC-1983 must be completely consistent with Resolution 701 of the Radio Regulations, and with the inter-Regional sharing agreements in the 12 GHz band that form part of these regulations and their appendices. Within these guidelines, Canada believes that the Conference has the task of drawing up a broadcasting-satellite plan in response to Region 2 requirements and based on perceived broadcasting-satellite system technical characteristics, both of which may differ considerably from those considered in 1977. To be consistent with Resolution 701, specific frequencies, polarizations, and orbit positions should be assigned to each service area of the Region. Moreover, there should be a detailed description of the baseline system characteristics of the system in each service area, so that the interference conditions between each pair of entries in the plan can be determined precisely.

On this basis, Canada believes that the planning approach should have the flexibility to accommodate changes in both requirements and the technical characteristics of systems implemented under the plan, and that the administrative regulations associated with the plan should provide this flexibility. Specifically, we are proposing that systems with characteristics different from the "baseline" characteristics assumed in developing the plan be allowed as long as these non-standard systems do not cause more interference nor request more protection than the standard system that they replace. Such non-standard systems could be notified without the need for a formal modification to the plan as long as the orbit position used is not different from that in the Plan. Protection of such systems would be indirect, through protection of the associated plan entry.

As well, if desired, systems having characteristics different from those specified in the Plan could be accommodated by a formal modification to the plan. These modifications might be permanent or for a specified period. In the latter case, the original entry in the plan would be unavailable for the period during which the modification to the Plan was in effect and would again be available at the end of this period. This would allow for flexibility for that specified period, with full protection from interference from other networks.

A number of planning techniques which have been developed in preliminary studies can be used to develop a plan incorporating these features. One technique is to assign frequencies at orbit positions without imposing a uniform spacing between orbit positions. This has two major advantages: 1) the resulting plan can have significantly greater assigned capacity and/or flexibility; and 2) it significantly eases the planning of the feeder links at 17 GHz. For example, sample plans have been developed for Region 2 with satellite spacings between 1° and 16°, with an average spacing of 3.7°.

Two other planning techniques are useful in increasing the flexibility of the plan, in some cases at the cost of reducing the assigned capacity available. One is to assign frequencies to a given service area at orbit positions such that there are no polarization constraints between those assignments and assignments to other service areas. Another is to assign channels in contiguous groupings rather than distribute them evenly across the total available bandwidth. Such assignments would ease the task of introducing non-standard systems during the lifetime of the plan, but may reduce the effective capacity of the assignment. Such techniques may or may not be used in making assignments to different service areas. Thus in such a planning approach administrations will be able to choose a compromise between the most desirable objectives such as high flexibility, high capacity, late eclipse time, and high elevation angle of the satellite.

4. Division of the band 12.1-12.3 GHz

The band 12.1-12.3 GHz is now allocated in Region 2 to the fixed, fixed-satellite (space-to-earth), mobile (except aeronautical mobile), broadcasting and broadcasting-satellite services on a primary basis. In accordance with footnote 841 of the Radio Regulations, the 1983 RARC will divide this band such that the lower portion will be allocated to the fixed-satellite service and the upper portion to the other services.

Canada has requirements for both broadcasting-satellite and fixed-satellite services. Based on the allocation which existed until 1979, Canada proceeded to design its fixed satellite system for service in the 12 GHz band and the first satellite in the ANIK C series operating in the 11.7-12.2 GHz band is already in operation. The 500 MHz capacity of this band was found to be optimum in devising channelization schemes to meet various requirements, including single channel per carrier thin route communication, high capacity voice and data communication and the transmission of television channels for further distribution by terrestrial systems. Canadian requirements for the broadcast satellite service also will require the use of 500 MHz of bandwidth. Based on several planning scenarios for Region 2, Canada believes that a 500 MHz bandwidth will be able to satisfy the known requirements of all countries in the Region.

Canada is, therefore, proposing that the band 12.1-12.3 GHz be divided equally such that the 12.1-12.2 GHz portion be allocated to the fixed-satellite service (space-to-earth), and the 12.2-12.3 GHz portion be allocated the same services as in the 12.3-12.7 GHz band, with all the pertinent footnotes in each band. The Canadian proposals for modifications to the Table of Frequency Allocations are included in Part II Section 3 of this document.

5. Administrative Regulations

Appendix 30 of the Radio Regulations includes several interim provisions dealing with the broadcasting-satellite service in Region 2 and other services in the 11.7-12.2 GHz band. These provisions are, for the most part, no longer applicable in Region 2 in view of the extensive revisions to the Radio Regulations brought about by the 1979 WARC.

The 1979 WARC (Resolution 504) and the recent Plenipotentiary Conference, (Resolution PLA/5) recognized that the work of the RARC-83 needs to be based on the results of the 1979 WARC and, in addition, that the decisions of

the RARC-83 will be considered for adoption and inclusion in the Radio Regulations by the First Session of the World Administrative Radio Conference on the use of the Geostationary-Satellite Orbit and the Planning of the Space Services Utilizing it, scheduled for June-August 1985. In order to facilitate the formal adoption of the decisions of RARC-83, Canada believes that the Final Acts of the Conference should be drawn up so as to be readily integrated into the Radio Regulations with a minimum of changes. To this end, the Canadian proposals have been prepared in the form of modifications and additions to Appendix 30 of the Radio Regulations to cover the Region 2 broadcasting -satellite down links (Space-to-Earth) requirements, and a new Appendix 30A to cover the Region 2 feeder links (Earth-to-Space) requirements.

In dealing with Appendix 30, care has been taken to preserve the integrity of the provisions which concern Regions 1 and 3, taking into account the relevant decisions of the 1979 WARC in this respect.

While Canada recognizes that only a World Conference is competent to amend the Radio Regulations, the RARC is nevertheless competent to adopt and implement any necessary provisions to meet the requirements of Region 2, within the framework of its agenda.

The Administrative Regulations dealing with the proposed changes to Appendix 30 and the new Appendix 30A, as well as amendments to Articles 8, 11, 13 and 15 and a new Article 15A, are contained in Part II of this document.

6. Technical Considerations

Canada has been active in the development of broadcasting satellite systems for the delivery of television directly to home receivers for over a decade. The first major step came with the launch of the HERMES satellite in 1976 to carry out a series of tests and field trials of small low-cost earth stations suitable for home receivers. This, in turn, led to the launch of the Telesat ANIK-B satellite in 1978 to do field trials under operational conditions in a wide variety of environments. These two satellites have provided Canada with a sound base of information and experience on which to develop an operational direct broadcasting satellite system. The extensive programme of studies associated with these programs has encompassed not only the technical area but also the economic, social, and regulatory implications of such systems.

These activities have led to technical studies and equipment development in all facets of the Broadcasting-Satellite Service. Many of the studies have been presented to various CCIR meetings and, in particular, to the CCIR Conference Preparatory Meeting (CPM) last June/July. Canadian contributions addressed several areas of concern, as the Region finalized its preparations for the RARC. Additional technical studies are underway to clarify some areas of uncertainty, some of which were identified by the CPM. In many areas Canada supports the conclusions of the CPM and has incorporated its findings into its proposals, taking into account subsequent discussions within the Region.

Canada considers it of fundamental importance that RARC-83 should establish a technical framework or basis for the Region 2 plan. This framework will establish the system characteristics to determine inter-system interference levels within which real systems can be implemented. The specification of such technical characteristics at the Conference must reflect a delicate balance between conservatism on the one hand and the optimism of future developments on the other. Within this technical framework administrations would then have the freedom to implement broadcasting satellite systems which will meet their unique needs through the flexibility built into the Canadian administrative regulatory procedures.

PART II

ADMINISTRATIVE REGULATIONS

PART II Section 1

PROPOSED CHANGES TO APPENDIX 30
OF THE RADIO REGULATIONS

INTRODUCTION TO PART II, Section 1

The Canadian proposals for modifications to Appendix 30

Canada considers that Appendix 30 developed by WARC 1977 forms a suitable framework within which the requirements for the broadcasting-satellite service (down-links) in Region 2 can be integrated. While some provisions have been added, modified or deleted to take into account the foreseen requirements of Region 2 or to take into account the interregional sharing criteria adopted by WARC 1979, the Canadian proposals have been developed in a manner such as to preserve the integrity of the original Appendix 30.

The proposed modifications to Appendix 30 have been kept to the essential minimum in order to meet the needs of Region 2. The main thrust of the proposals is to increase the flexibility in the usage of the assignments in the Region 2 Plan to provide for the growth stages of the broadcasting-satellite service in the Region while at the same time ensuring that the basic principles of the Plan are not jeopardized.

Reasons for the changes to Appendix 30

Articles 1 and 2

The changes introduced in these articles are consequential and editorial and take into account the 1979 WARC revisions to the Allocations Table between 11.7 and 12.7 GHz in Region 2 noting that Canada, in consideration of Footnote 841, is proposing a lower limit of 12.2 GHz for the broadcasting-satellite service in Region 2. ADD[1] has been introduced under Article 2 to take into account the allocation of the band 12.5-12.75 GHz to the broadcasting-satellite service in Region 3 and the associated guidelines of Resolution 34.

Article 3

SUP 3.2 The suppression of this provision is consequential.

ADD 3.2A The objective of this proposal is to provide for the use of assignments in the Plan with different characteristics but not different orbital positions than those of the Plan without the necessity of applying the modification procedure of Article 4 and its inherent delays such as would be the case under the provisions of 4.1 a) and 4.3.2. It is Canada's view that, since the protection margins of assignments to other administrations in the Plan would not be affected under this provision, an assignment of this kind could be treated at the outset as though it was an assignment fully in accordance with the Plan because the Plan is not affected in any way. The provisions of Article 5 could thus be applied immediately.

ADD 3.2A does not provide for a change in orbital position of a planned assignment, even though the protection margins of other administrations may not be consequently affected, because it is considered that the orbital position is the key element of any assignments in the Plan and that any proposed changes to this element should only be sought through the modification procedure of Article 4.

The associated entry in the Plan would remain in the Master Register and the different characteristics noted by the Board for information only. This 3.2A assignment would only be protected to the extent of the limits associated with that entry in the Plan.

Article 4

ADD 4.1.1 As mentioned under the explanation covering ADD 3.2A, Canada considers the orbital position to be the key element of any assignments in the Plan. In Canada's view, a modification under 4.1 a) where the characteristics of an assignment in the Plan including its associated orbital position may be altered, is quite appropriate in view of the fact that the original orbital position is being modified, i.e. replaced and released for the use of any administration who may have exhausted its complement of assignments/positions in the Plan.

On the other hand, while Canada believes that the provisions of 4.1 b) for the addition of new assignments/positions to the Plan is also quite appropriate to meet any future broadcasting-satellite requirements of administrations, it is considered that any such proposed addition of new assignments/orbital positions under 4.1 b) would normally be sought only when an administration had exhausted its complement of assignments/positions in the Plan or when strict adherence to this principle is unpracticable in certain cases.

The principle of ADD 4.1.1 will not hinder the growth possibilities of the Plan since the procedure of Article 4 still provides for any proposed additional spectrum/orbit resources beyond those resources made available in the Plan to each administration on the date of entry into force of the Final Acts.

ADD 4.1.2 This provision is intended to provide some flexibility in the use of assignments/positions in the Plan during the growth stages of the broadcasting-satellite service in Region 2 and particularly during the early stages while, at the same time, adhering to the basic principles of Article 4.

It is foreseen that during the early stages of the development of broadcasting-satellite systems in Region 2, an administration or groups of administrations may wish to implement first generation systems having characteristics different from those of the Plan. Such first generation systems could be replaced later by systems based more closely on the general configuration of the Region 2 Plan.

The proposed 4.1.2 would provide for the characteristics, including the orbital position of an assignment in the Plan, to be modified for use during a specified period of time after which any modified assignments or modified position would be released and a next generation broadcasting-satellite space station could be implemented using the original assignments/position in the Plan. This type of modification would require adherence to the procedures of Article 4 including coordination and any associated agreements covering the specified period, as necessary.

The principle of ADD 4.1.1 is not intended to be applicable to the 4.1.2 situation because of the interim nature of this kind of modification coupled with the fact that any new assignments/positions resulting from the modification process must be released at the end of the specified period involved.

The entry in the Plan would remain in the Master Register and the specific period assignment shown against this entry together with its characteristics. The protection margins of the associated assignments in the Plan would remain unchanged so that the entry in the Plan and its protection margin can be available once the "specified period" was no longer in effect. The "specified period" modification would provide and obtain the same degree of protection as that available to the associated assignments in the Plan or within the nominal limits of the Plan (Annex 1) or as may be agreed between the administrations affected.

When examining any modifications, the Board would take into account the overall effects of modifications on protection margins together with any time periods involved.

MOD 4.3 to 4.3.1.4 inclusive. These modifications are essentially of an editorial nature and serve to introduce the Region 2 Plan into the various texts and to establish the relationship between the Regions 1 and 3 Plan and the Region 2 Plan.

ADD [1]Since it is proposed that for Region 2 some modifications may be of a permanent nature and others for specified periods only, it will be necessary in any coordination process to take into account the different time frames associated with these modifications, and any resultant changes in the overall protection margins of assignments in the Plan during these periods.

MOD 4.3.1.4 An editorial change for purposes of clarification.

ADD 4.3.1.5 To take into account the interregional sharing decisions of the WARC 1979.

MOD 4.3.1.6 and 4.3.2. Editorial changes for clarification without change in context.

MOD 4.3.1.7 A proposed modification to the Plan may include a number of additions and deletions each of which would change in some way the interference into an assignment of the service area of another administration. It would seem appropriate to consider the sum-total of this set of modifications in determining whether one is affected.

ADD 4.3.14A The Board will need to ensure that administrations with a space station operating under the provisions of 4.1.2 are made aware of the pending expiration of the provisional status of the assignment.

ADD 4.3.19 The provisions proposed emphasize the importance of updating the Master Register on a continuing basis.

Article 5

ADD 5.2.6A This is to emphasize that the different characteristics of an assignment notified under the provisions of 3.2A protect and are only protected to the extent of the margins of the associated entry and characteristics in the Plan and that the entry in the Plan is the reference to be used by the Board when examining other notices.

ADD [1]When the Board receives a notice for the implementation of an assignment under the provisions of 3.2A the Board needs to take an overall examination of any possible effect to other assignments in the Plan, taking into account changes in the characteristics which may be acceptable even though these characteristics may differ than those shown in the Plan.

Article 6

Only the title of the Article has been modified to reflect the decisions of the 1979 WARC.

Article 7

The procedures of Article 7 have been modified to take into account all the regional and interregional sharing criteria between broadcasting-satellite stations and fixed satellite stations as developed by the 1979 WARC and its Resolutions 31 and 700.

One important addition to the text of the original Article 7 is the integration of provisions for the application in Region 2 of No 846 of the Radio Regulations and in this respect, it is proposed that assignments meeting without exception the provisions of No 846 should be treated as though they were assignments shown in the Region 2 Plan. The protection margin of a fixed satellite assignment under No 846 would be identical as that of the entry in the Plan which it replaces so that this assignment may be used at a later date in the broadcasting-satellite mode.

Article 9

Only the title of the original Article 9 has been changed to reflect the decisions of the 1979 WARC.

Article 13

NOC 13.1 It is anticipated that upon adoption and inclusion in the Radio Regulations of the Final Acts of the RARC, the Region 2 Plan will form part of a world agreement. Refer proposed Resolution B, resolves 2.

Articles 15A and 16

Canada proposes that the Final Acts of the 1983 RARC be adopted by the 1985 WARC as a World Agreement and integrated as such in the Radio Regulations.

It is proposed in ADD 16.1A that the Plan developed by the RARC should provide for broadcast satellite requirements for a period of at least 15 years, i.e. a period for which requirements can be foreseen.

APPENDIX 30

MOD (Title) Provisions for All Services and Associated Plans for the Broadcasting-Satellite Service in Frequency Bands 11.7-12.2 GHz (in Regions ~~2 and~~ 3), and 11.7-12.5 GHz (in Region 1)[1] and 12.2-12.7 GHz (in Region 2)

(see Article 15)

TABLE OF CONTENTS
(to be consequently modified)

NOC [1] The Provisions.....

ARTICLE 1

General Definitions

MOD 1.1 For the purposes of this Appendix the following terms shall have the meanings defined below:

Conference: World Administrative Radio Conference for the Planning of the Broadcasting-Satellite Service in Frequency Bands 11.7-12.2 GHz (in Regions 2 and 3) and 11.7-12.5 GHz (in Region 1), called in short World Broadcasting-Satellite Administrative Radio Conference, Geneva, 1977;

Region 2 Conference: Regional Administrative Radio Conference (RARC) for the Planning of the Broadcasting-Satellite Service in the 12.2-12.7 GHz Band and Associated Feeder Links in the 17.3-17.8 GHz Band (Geneva 1983);

Regions 1 and 3 Plan: The Plan for Regions 1 and 3 and its annexes;

Region 2 Plan: The Plan for Region 2 and its annexes;

Plan/s: The Plan for Regions 1 and 3 and/or for Region 2 and their annexes;

Same Plan: - For the Members of Regions 1 and 3, the Regions 1 and 3 Plan, and

- for the Members of Region 2, the Region 2 Plan

Other Plan: - For the Members of Regions 1 and 3, the Region 2 Plan and,

- for the Members of Region 2, the Regions 1 and 3 Plan.

Frequency assignment in accordance with the Plans: Any frequency assignment which appears in the Plans or for which the procedure of Article 4 of this Appendix has been successfully applied.

ARTICLE 2

Frequency Bands

MOD 2.1 The provisions of this Appendix apply to the broadcasting-satellite service in the frequency bands between 11.7 GHz and 12.5 GHz in Region 1, ~~and~~ between 11.7 GHz and 12.2 GHz in Regions ~~2 and~~ 3[1] and between 12.2 and 12.7 GHz in Region 2 and to the other services to which these bands are allocated, so far as their relationship to the broadcasting-satellite service in these bands is concerned.

ADD [1] In the application of No. 847 of the Radio Regulations pertaining to the broadcasting-satellite service in the frequency band 12.5-12.75 GHz in Region 3, refer to Resolution No. 34 of the Radio Regulations.

ARTICLE 3

MOD (Title) Execution of the Provisions and Associated Plans

MOD 3.1 The Members of the Union ~~in Regions 1 and 3~~ shall adopt, for their broadcasting-satellite space stations operating in the frequency bands referred to in this Appendix, the characteristics specified in the Plans ~~for those Regions.~~

SUP 3.2

ADD 3.2A An administration may implement its assignments in the Region 2 Plan using different characteristics but not different orbital positions than that of the Plan without applying the procedure of Article 4 and proceed directly with the application of Article 5 provided that the overall protection margin[1] associated with all assignments of other administrations are not consequently reduced. The use of this assignment will only be protected to the extent of the limits associated with that entry in the Plan.

ADD [1]The expression "overall protection margin" is defined in Annex 1.

(MOD)3.3 The Members of the Union shall not change the characteristics specified in the Plans, or establish new broadcasting-satellite space stations or stations in the other services to which these frequency bands are allocated, except as provided for in the Radio Regulations and the appropriate Articles and Annexes of this Appendix.

ARTICLE 4

(MOD)(Title) Procedure for Modifications to the Plans

(MOD)4.1 When an administration intends to make a modification[1] to ~~the~~ a Plan, i.e. either:

a) to modify the characteristics of any of its frequency assignments to a space station[2] in the broadcasting-satellite service which are shown in ~~the~~ that Plan, or for which the procedure in this Article has been successfully applied, whether or not the station has been brought into use; or

b) to include in ~~the~~ that Plan a new frequency assignment to a space station in the broadcasting-satellite service; or

c) to cancel a frequency assignment to a space station in the broadcasting-satellite service;

the following procedure shall be applied before any notification of the frequency assignment is made to the International Frequency Registration Board (see Article 5 of this Appendix).

MOD [1]Insofar as Regions 1 and 3 administrations are concerned, the intention not to employ energy dispersal consistent with paragraph 3.18 of Annex 8 shall be treated as a modification and thus subject to the appropriate provisions of this Article.

NOC [2]The expression.....

Article 4 (cont'd)

ADD 4.1.1 Before an administration proposes to include in the Region 2 Plan under the provisions of 4.1 b), a new frequency assignment to a space station or to include in the Plan new frequency assignments to a space station whose orbital position is not designated in the Plan to this administration, all of the assignments of this administration in the Plan shall normally have been brought into service or have been notified to the Board in accordance with Article 5 of this Appendix.

ADD 4.1.2 An administration may also propose to modify under the provisions of 4.1 a) for a specified period[1], the characteristics of its frequency assignment(s) to a space station in the broadcasting-satellite service which are shown in the Region 2 Plan. During that specified period, the frequency assignment that has been modified shall not be available for use by that administration. At the end of this specified period, the modification shall lapse and the frequency assignment in the Plan shall be available for use by that administration.

NOC 4.2

(MOD) 4.3 Proposed modifications to a frequency assignment in accordance with ~~the~~ a Plan or the inclusion in ~~the~~ a Plan of a new frequency assignment

(MOD) 4.3.1. An administration proposing a modification to the characteristics of a frequency assignment in accordance with ~~the~~ a Plan or the inclusion of a new frequency assignment in ~~the~~ a Plan shall seek the agreement of those administrations:

MOD 4.3.1.1 having a frequency assignment in the same Plan to a space station in the broadcasting-satellite service in the same channel or an adjacent channel, which is in accordance with ~~the~~ that Plan or in respect of which modifications to ~~the~~ that Plan have been published by the Board in accordance with the provision of this Article[1]; or

MOD 4.3.1.2 having a frequency assignment in the other Plan to a space station in the broadcasting-satellite service ~~in Region 2~~ with the necessary bandwidth, any portion of which falls within the necessary bandwidth of the proposed assignment and which is ~~recorded in the Master Register; or~~ in accordance with that Plan or in respect of which modifications have been published by the Board in accordance with the provisions of this Article; or

---

ADD [1]In applying the provisions of 4.1.2 and 4.3.1.1 for Region 2 administrations, account shall be taken of the relevant effective period associated with assignments in the Region 2 Plan which have been modified or are being modified in accordance with this Article.

Article 4 (cont'd)

- ~~which has been coordinated or is being coordinated under the provisions of Resolution 33; or~~
- ~~which appears in a Region 2 plan[1] to be adopted at a future regional administrative radio conference, taking account of modifications which may be introduced subsequently in accordance with the final acts of that conference; or~~

NOC 4.3.1.3

MOD 4.3.1.4 of Region 2 having a frequency assignment in the band 11.7-12.2 GHz to a space station in the fixed-satellite service which is recorded in the Master Register or which has been coordinated or is being coordinated under the provisions of No. 1060 of the Radio Regulations; or those of paragraph 7.2.1 of this Appendix; or ~~which are considered to be affected~~

SUP [1]The Region 2 plan . . . .

ADD 4.3.1.5 of Regions 1 and 3 having a frequency assignment in the band 12.5-12.7 GHz to a space station in the fixed-satellite service which is recorded in the Master Register or which has been coordinated or is being coordinated under the provisions of No. 1060 of the Radio Regulations; or those of paragraph 7.2.1 of this Appendix;

(MOD) 4.3.1.6 which are considered to be affected.

MOD 4.3.1.7 A frequency assignment is considered to be affected when the limits shown in Annex 1 are exceeded. When an administration of Region 2 proposes a modification under 4.1 a), the total effect of replacing one or more assignments by one or more other assignments shall be considered in applying Annex 1.

MOD 4.3.2 An administration intending to modify characteristics in ~~the~~ a Plan shall send to the Board, not earlier than five years but not later than eighteen months before the date on which the assignment is to be brought into use, the relevant information listed in Annex 2. If the assignment is not brought into use by that date, the modification shall lapse and the original assignment shall remain in that Plan.

NOC 4.3.2.1 to 4.3.14 inclusive

ADD 4.3.14A When a modification to the Region 2 Plan is in effect for a specified period in accordance with the provisions of 4.1.2, the Board shall, three months prior to the expiration of the period, draw the attention of the administration concerned of the forthcoming change to the status of the modified assignment.

NOC 4.3.15 to 4.3.18 inclusive

ADD 4.3.19 Upon successful completion of the modification procedure of this Article, the Board shall make the appropriate changes to those assignments in the Master Register which are involved including a special remark with the dates referred to in 4.3.2 and the period referred to in 4.1.2 as applicable.

NOC 4.4 to 4.5.2 inclusive

ARTICLE 5

(MOD) Notification, Examination and Recording in the Master Register of Frequency Assignments to Space Stations in the Broadcasting-Satellite Service. ~~in Regions 1 and 3~~

NOC 5.1 to 5.2 inclusive

NOC [1]Where appropriate....

MOD 5.2.1 The Board shall examine each notice:

a) with respect to its conformity with the Convention and the relevant provisions of the Radio Regulations and Annex 1 of this Appendix (with the exception of those relating to conformity with the Plans);

b) with respect to its conformity with the Plans[1]

ADD [1]When examining a notice with respect to its conformity with the provisions of 3.2A, the Board shall ensure that the orbital position is as shown in the Plan and that the effects of all other characteristics of the notified assignment shall not reduce the overall protection margin of other assignments in the Plan.

NOC 5.2.2 to 5.2.6 inclusive

ADD 5.2.6A In the application of the provisions of 3.2A associated with the Region 2 Plan, the different characteristics shown in the notice are given for information only and the Board shall so identify all such assignments in the Master Register.

NOC 5.2.7 to 5.3.2 inclusive

ARTICLE 6

MOD (Title) Coordination, Notification and Recording in the Master International Frequency Register of Frequency Assignments to Terrestrial Stations Affecting Broadcasting-Satellite Frequency Assignments in the Bands 11.7-12.2 GHz (in Regions ~~2 and~~ 3), 11.7-12.5 GHz (in Region 1),[2] and 12.2-12.7 GHz (in Region 2)[1]

NOC [1]These procedures do not involve....

SUP [2]The procedures for coordination....

NOC 6.1.1 to 6.3.40 inclusive

ARTICLE 7

MOD (Title) Preliminary Procedures, Notification and Recording in the Master International Frequency Register of Frequency Assignments to Stations in the Fixed-Satellite Service ~~in the Frequency Band 11.7-12.2 GHz (in Region 2)~~ When Frequency Assignments to Broadcasting-Satellite Stations in Accordance with the Plans Are Involved[1]

ADD 7.0 The provisions of this Article apply to:

- Region 2 fixed satellite systems in the frequency band 11.7-12.2 GHz to protect the Regions 1 and 3 Plan;
- Region 1 fixed-satellite systems in the frequency band 12.5-12.7 GHz and Region 3 fixed satellite systems in the frequency band 12.2-12.7 GHz to protect the Region 2 Plan;
- Region 2 fixed-satellite systems which are to be operated in accordance with No. 846 of the Radio Regulations.

NOC [1]These provisions do not replace.....

NOC 7.1.1

ADD 7.1.1A The provisions of 7.1.1 are not applicable to Region 2 administrations who intend to establish a fixed-satellite system in accordance with No. 846 of the Radio Regulations.

NOC 7.1.2 to 7.2.1 inclusive

ADD 7.2.1A No coordination is required under 7.2.1 for assignments that are to be notified by Region 2 administrations under the provisions of No. 846 of the Radio Regulations.

NOC 7.2.2 to 7.2.13 inclusive

MOD 7.3.1 Any frequency assignment to a space station in the fixed satellite service shall be notified to the Board:

a) if the use of the frequency concerned is capable of causing harmful interference to a frequency assignment of another administration which is in accordance with the Plans[1]; or

b) if it is desired to obtain international recognition of the use of the frequency,

c) if this frequency assignment is to be used in Region 2 under the provisions of No. 846 of the Radio Regulations.

NOC 7.3.2 to 7.3.3 inclusive

ADD 7.3.3A An administration of Region 2 which intends to apply the provisions of No 846 of the Radio Regulations for transmissions in the fixed-satellite service (space-to-Earth) shall, in addition to the information referred to in 7.3.3, specify the frequency assignments in the Region 2 Plan which will be employed by the fixed-satellite system.

NOC [1]The attention ....

Article 7 (cont'd)

NOC 7.3.4 to 7.4.5.3 inclusive

ADD 7.4.5.3A where the notice is submitted under the provisions of No 846 of the Radio Regulations, with respect to its compatability, using the criteria of 3.2A of this Appendix, with frequency assignments in conformity with the Region 2 Plan.

NOC 7.4.6 to 7.4.10 inclusive

ADD (Sub-Title) 7.4.11A For administrations of Region 2, finding with respect to 7.4.5.1 and 7.4.5.3A

ADD 7.4.11A.1 If the finding is favourable with respect to 7.4.5.1 and 7.4.5.3A, the assignment shall be recorded in the Master Register with a symbol in the Remarks Column against the assignment of the Region 2 Plan which is to be employed by the fixed-satellite system. If the finding is unfavourable it shall be returned immediately by airmail to the notifying administration with the reasons of the Board for this finding.

(Note: Some minor editorial changes would be required within Article 7 to reflect the existence of two Plans.)

NOC ARTICLE 8

MOD (Title) ARTICLE 9

Power Flux-Density Limits Between ~~11.7~~ 12.2 GHz and ~~12.2~~ 12.5 GHz to Protect Terrestrial Services in Regions 1 and 3 from Interference from Region 2 Broadcasting-Satellite Space Stations

NOC 9.1

NOC ARTICLE 10

NOC ARTICLE 11

SUP ARTICLE 12

ADD ARTICLE 12A

The Plan for the Broadcasting-Satellite Service in the Frequency Band 12.2-12.7 GHz in Region 2

(to be developed by the RARC)

ARTICLE 13

Relationship to Resolution 507

NOC 13.1 (refer Resolution A, resolves 2)

NOC ARTICLE 14

NOC ARTICLE 15

ADD ARTICLE 15A

Entry into Force of the Final Acts of the
Regional Broadcasting-Satellite
Administrative Radio Conference, Geneva, 1983

15.A1 These Final Acts shall enter into force on 1 January 1985 at 0001 hours UTC.

Note: Upon the inclusion of this addition to Appendix 30 in the Radio Regulations, the provision of 15A1 would be converted into a footnote against the title of the Appendix.

ARTICLE 16

MOD(Title) Period of Validity of the Provisions and Associated Plans

MOD 16.1 The provisions and associated Regions 1 and 3 Plan have been prepared in order to meet the requirements of the broadcasting-satellite service in the bands concerned for a period of at least fifteen years from 1 January 1979.

ADD 16.1A The provisions and associated Region 2 Plan have been prepared in order to meet the requirements of the Broadcasting-Satellite service in the bands concerned for a period of at least fifteen years from Jan 1, 1985.

(MOD)16.2 In any event, the provisions and associated Plans shall remain in force until their revision by a competent administrative radio conference convened in accordance with the relevant provisions of the Convention in force.

PART II Section 2

PROPOSED NEW APPENDIX 30A FOR FEEDER LINKS TO THE BROADCASTING-SATELLITE SERVICE IN REGION 2

INTRODUCTION TO PART II, Section 2

Appendix 30A - Uplinks

Because of the interrelationship of the down-link Plan of Appendix 30 and the up-link (feeder-link) Plan proposed in Appendix 30A, Canada is of the view that similar administrative regulations as those of Appendix 30 should be applied to Appendix 30A. The same flexibility referred to under the preamble to the proposals for modifications to Appendix 30 has been provided for the feeder-link Plan. In order to simplify Articles 5 and 6, it is proposed that the procedures of appropriate articles in the Radio Regulations be made applicable to cover various situations.

APPENDIX 30A

(Title) Provisions for Feeder Links for the Broadcasting-Satellite Service utilizing the Fixed-Satellite Service (Earth-to-Space) in the Frequency Band 17.3-17.8 GHz (in Region 2)

(see Article 15A)

ARTICLE 1

General Definitions

1.1 For the purpose of this Appendix the following terms shall have the meaning defined below:

Region 2 Conference: Regional Administrative Radio Conference (RARC for the Planning of the Broadcasting-Satellite Service in the 12.2-12.7 GHz band and the associated Feeder Links in Region 2, 17.3-17.8 GHz (Geneva, 1983);

Region 2 Plan: The Plan for Region 2 and its annexes;

Frequency assignment in accordance with the Plan: Any frequency assignment which appears in the Plan and is in the Master Register or for which the procedure of Article 4 of this Appendix has been successfully applied;

Frequency allotment in accordance with the Plan: Any frequency allotment which appears in the Plan or for which the Article 4 procedure of this Appendix have been successfully applied.

ARTICLE 2

Frequency Bands

2.1 The provisions of this Appendix apply to the feeder links for the broadcasting-satellite service utilizing the fixed-satellite service (Earth-to-Space) in the frequency band 17.3-17.8 GHz in Region 2 and to the other services to which this band is allocated so far as their relationship to the fixed-satellite service (Earth-to-Space) in this band is concerned.

ARTICLE 3

Execution of the Provisions and Associated Plan

3.1 The Members of the Union in Region 2 shall adopt for their feeder link space and earth stations in the fixed-satellite service (Earth-to-Space) in the frequency band referred to in this Appendix, the characteristics specified in the Region 2 Plan.

Article 3 (cont'd)

3.2 An administration may implement its assignments/allotments in the Region 2 Plan using different characteristics but not different orbital positions than that of the Plan without applying the procedure of Article 4 and proceed directly with the application of Article 5 provided that the overall protection margins[1] associated with all assignments/allotments of other administrations are not consequently reduced. The use of this assignment/allotment will only be protected to the extent of the limits associated with that entry in the Plan.

3.3 The Members of the Union in Region 2 shall not change the characteristics specified in the Plan, or establish new feeder link space stations or earth stations in the fixed-satellite service or stations of other services to which these frequency bands are allocated, except as provided for in the Radio Regulations and the appropriate Articles and Annexes to this Appendix.

[1]The expression "overall protection margin" is defined in Annex 1 of Appendix 30.

ARTICLE 4

Procedure for Modifications to the Region 2 Plan (17.3-17.8 GHz)

4.1 When an administration intends to make a modification to the Plan, i.e. either;

a) to modify the characteristics of any of its frequency assignments or allotments to a space[1] or earth station in the fixed-satellite service which are shown in the Plan, or for which the procedure in this Article has been successfully applied, whether or not the station has been brought into use, or

b) to include in the Plan a new frequency assignment or allotment to a space or earth station in the fixed-satellite service, or

c) to cancel a frequency assignment/allotment to a space or earth station in the fixed-satellite service,

the following procedure shall be applied before any notification of the frequency assignment is made to the International Frequency Registration Board (see Article 5 of this Appendix).

4.1.1 Before an Administration proposes under the provisions of 4.1 b) to include in the Plan a new frequency assignment or allotment for reception at a space station or to include in the Plan a new frequency assignment or allotment for reception at a space station whose orbital position is not designated in the Plan to this Administration, all of the assignments/allotments of this Administration appearing in the Plan shall normally have been brought into service or have been notified to the Board in accordance with Article 5 of this Appendix.

[1]The expression "frequency assignment/allotment to a space station", wherever it appears in this Article, shall be understood to refer to a frequency assignment/allotment associated with a given orbital position.

Article 4 (cont'd)

4.1.2 An administration may also propose to modify under the provisions of 4.1a) for a specified period[1], the characteristics of its frequency assignment(s)/allotment(s) to a feeder link space or earth station in the fixed-satellite service which are shown in the Region 2 Plan. During that specified period, the frequency assignment/allotment that has been modified shall not be available for use by that administration. At the end of this specified period, the modification shall lapse and the frequency assignment/allotment in the Plan shall be available for use by that administration.

4.2 The term "frequency assignment or frequency allotment in accordance with the Plan" used in this and the following articles is defined in Article 1.

4.3 (Sub-Title) Proposed modifications to a frequency assignment or allotment in accordance with the Plan or the inclusion in the Plan of a new frequency assignment or allotment.

4.3.1 An administration proposing a modification to the characteristics of a frequency assignment/allotment in accordance with the Plan of the inclusion of a new frequency assignment/ allotment in the Plan shall seek the agreement of those administrations:

4.3.1.1 having a feeder link frequency assignment in the fixed-satellite service (Earth-to-space) in the same channel or an adjacent channel and which is included in the Plan[1];

4.3.1.2 having a frequency assignment in the band 17.7-17.8 GHz to a space station or an earth station in the fixed-satellite service (space-to-Earth) which is recorded in the Master Register or which has been coordinated in or is being coordinated under the provisions of No. 1060 of the Radio Regulations;

4.3.1.3 having a frequency assignment to a terrestrial station in the band 17.7-17.8 GHz located within the coordination area of the feeder link fixed-satellite earth station whose frequency assignment is proposed to be modified or, intending to bring into use a frequency assignment to a terrestrial station within three years of the projected date of bringing the feeder link modification into effect;

4.3.1.4 which are considered to be affected.

4.3.1.5 A frequency assignment/allotment is considered to be affected when the limits shown in Annex 1 of this Appendix are exceeded. When an administration of Region 2 proposes a modification under 4.1a), the total effect of replacing one or more assignments/ allotments by one or more other assignments/allotments shall be considered in applying Annex 1.

---

[1] In applying the provisions of 4.1.2 and 4.3.1.1, for Region 2 administrations, account shall be taken of the relevant effective period associated with assignments/allotments in the Region 2 Plan which have been modified or are being modified in accordance with this Article.

Article 4 (cont'd)

4.3.2 An administration intending to modify characteristics in the Plan shall send to the Board, not earlier than five years but not later than eighteen months before the date on which the assignment is to be brought into use, the relevant information listed in Annex 2. If the assignment is not brought into use by that date, the modification shall lapse and the original assignment/allotment shall remain in the Plan.

4.3.2.1 Where as a result of the intended modification the limits defined in Annex 1 are not exceeded, this fact shall be indicated when submitting to the Board the information required by 4.3.2. The Board shall then publish this information in a special section of its weekly circular.

4.3.2.2 In all other cases the administration shall notify the Board of the names of the administrations whose agreement it considers should be sought in order to arrive at the agreement referred to in 4.3.1 as well as of those with which agreement has already been reached.

4.3.3 The Board shall determine on the basis of Annex 1 the administrations whose frequency assignments are considered to be affected within the meaning of 4.3.1. The Board shall include the names of those administrations with the information received under 4.3.2.2 and shall publish the complete information in a special section of its weekly circular. The Board shall immediately send the results of its calculations to the administration proposing the modification to the Plan.

4.3.4. The Board shall send a telegram to the administrations listed in the special section of the weekly circular drawing their attention to the information it contains and shall send them the results of its calculations.

4.3.5. An administration which feels that it should have been included in the list of administrations whose services are considered to be affected may, giving the technical reasons for so doing, request the Board to include its name. The Board shall study this request on the basis of Annex 1 and shall send a copy of the request with an appropriate recommendation to the administration proposing the modification to the Plan.

4.3.6 Any modification to a frequency assignment/allotment which is in accordance with the Plan or any inclusion in the Plan of a new frequency assignment/allotment which would have the effect of exceeding the limits specified in Annex 1 shall be subject to the agreement of all affected administrations.

4.3.7 The administration seeking agreement or the administration with which agreement is sought may request any additional technical information it considers necessary. The administrations shall inform the Board of such requests.

Article 4 (cont'd)

4.3.8 Comments from administrations on the information published pursuant to 4.3.3 should be sent either directly to the administration proposing the modification or through the Board. In any event the Board shall be informed that comments have been made.

4.3.9 An administration which has not notified its comments either to the administration seeking agreement or to the Board within a period of one hundred and twenty days following the date of the weekly circular referred to in 4.3.2.2 or 4.3.3 shall be understood to have agreed to the proposed modification. This time limit may be extended by eighty days for an administration which has requested additional information under 4.3.7 or for an administration which has requested the assistance of the Board under 4.3.17. In the latter case the Board shall inform the administration concerned of this request.

4.3.10 If, in seeking agreement, an administration modifies its initial proposal, it shall again apply the provisions of 4.3.2 and the consequent procedure with respect to any other administration whose services might be affected as a result of modifications to the initial proposal.

4.3.11 If no comments have been received on the expiry of the periods specified in 4.3.9, or if agreement has been reached with the administrations which have made comments and with which agreement is necessary, the administration proposing the modification may continue with the appropriate procedure in Article 5 and shall inform the Board, indicating the final characteristics of the frequency assignment together with the names of the administrations with which agreement has been reached.

4.3.12 The agreement of the administrations affected may also be obtained in accordance with this Article, for a specified period.

4.3.13 When the proposed modification to the Plan involves developing countries, administrations shall seek all practicable solutions conducive to the economical development of the broadcasting-satellite systems of these countries.

4.3.14 The Board shall publish in a special section of its weekly circular the information received under 4.3.11 together with the names of any administrations with which the provisions of this Article have been successfully applied. The frequency assignment/allotment concerned shall enjoy the same status as those appearing in the Plan and will be considered as a frequency assignment/allotment in accordance with the Plan.

4.3.15 When an administration proposing to modify the characteristics of a frequency assignment/allotment or to make a new frequency assignment/allotment receives notice of disagreement from an administration whose agreement it has sought, it should first endeavour to solve the problem by exploring all possible means of meeting its requirement. If the problem still cannot be solved by such means, the administration whose agreement has been sought should

Article 4 (cont'd)

endeavour to overcome the difficulties as far as possible, and shall state the technical reasons for any disagreement if the administration seeking the agreement requests it to do so.

4.3.16 If no agreement is reached between the administrations concerned, the Board shall carry out any study that may be requested by these administrations; the Board shall inform them of the result of the study and shall make such recommendations as it may be able to offer for the solution of the problem.

4.3.17 An administration may at any stage in the procedure described or before applying it, request the assistance of the Board, particularly in seeking the agreement of another administration.

4.3.18 The relevant provisions of Article 5 of this Appendix shall be applied when frequency assignments/allotment are notified to the Board.

4.3.19 Upon successful completion of the modification of the Plan as a result of the application of this Article, the Board shall make the appropriate changes to those assignments/allotment in the Master Register which are involved including a special remark with the dates referred to in 4.3.2 and the period referred to in 4.1.2 as applicable.

4.3.20 When a modification to the Plan has been in effect for a specified period in accordance with the provisions of 4.1.2, the Board shall, three month prior to the expiration of the period, draw the attention of the administration concerned of the forthcoming change to the status of the modified assignment/allotment.

4.4 Cancellation of frequency assignments/allotments

When a frequency assignment/allotment in accordance with the Plan is released, whether or not as a result of a modification, the administration concerned shall immediately so inform the Board. The Board shall publish this information in a special section of its weekly circular.

4.5 Master copy of the Plan

4.5.1 The Board shall maintain an up-to-date master copy of the Plan taking account of the application of the procedure specified in this Article. The Board shall prepare a document listing the amendments to be made to the Plan as a result of modifications made in accordance with the procedure in this Article.

4.5.2 The Secretary-General shall be informed by the Board of modifications made to the Plan and shall publish an up-to-date version of the Plan in an appropriate form when justified by the circumstances.

ARTICLE 5

Notification, Examination and Recording in the Master Register of Frequency Assignments/Allotments to Earth Stations and Space Stations in the Fixed-Satellite Service (Earth-to-Space) 17.3-17.8 GHz for Use by Feeder Links to the Broadcasting-Satellite Service in Region 2

5.1 Whenever an administration intends to bring into use a feeder link frequency assignment/allotment to a receiving space station in the fixed-satellite service or to a transmitting earth station in the fixed-satellite service, it shall notify this frequency assignment/allotment to the Board. For this purpose, the notifying administration shall apply the provisions of Article 13 of the Radio Regulations with the following additional considerations:

5.2 For any notification under 5.1, an individual notice for each frequency assignment/allotment shall be drawn up as prescribed in Annex 2, the various sections of which specify the basic characteristics to be provided as appropriate. It is recommended that the notifying administration should also apply any other data it may consider useful.

5.3 In the application of the provisions of 3.2 associated with the Region 2 Plan, the different characteristics shown in the notice are given for information only and the Board shall so identify all such assignments in the Master Register.

5.4 In the application of No. 1496, each notice shall be submitted in order to reach the Board not earlier than three years before the date on which the assignment is to be brought into use. In any case, the notice must reach the Board not later than ninety days before that date[1].

5.5 In the application of No. 1503, the Board shall also examine the notice as to its conformity with the Plan[2] in this Appendix;

5.6 For assignments that are in accordance with the Plan, the coordination of Nos. 1504 and 1505 of Article 13 of the Radio Regulations shall be considered as completed.

---

[1]Where appropriate, the notifying administration shall initiate the procedure for modifying the Plan in sufficient time to ensure that this limit is observed.

[2]When examining a notice with respect to its conformity with the provisions of 3.2, the Board shall ensure that the orbital position is as shown in the Plan and that the effects of all other characteristics of the notified assignment/allotment shall not reduce the overall protection margin of other assignments in the Plan.

ARTICLE 6

Coordination, Notification and Recording in the Master International Frequency Register of Frequency Assignments to stations in the Band 17.7 - 17.8 GHz of Services other than the Fixed-Satellite Service (Earth-to-Space) Feeder Links

6.1 All proposed frequency assignments to stations covered under the heading of this Article shall be coordinated, notified and recorded in the Master Register in accordance with Articles 11, 12, 13 and 15A of the Radio Regulations as applicable.

6.2 In the application of the procedures covered under this Article, the relevant provisions of this Appendix dealing with the compatability between the assignments/allotments in the Plan to the fixed-satellite service (Earth-to-Space) feeder links 17.7-17.8 GHz and the other services sharing this band, shall be observed.

ARTICLE 7

Miscellaneous Provisions Relating to the Procedures

7.1 If it is requested by any administration, and if the circumstances appear to warrant, the Board, using such means at its disposal as are appropriate in the circumstances, shall conduct a study of cases of alleged contravention or non-observance of these provisions or of harmful interference.

7.2 The Board shall thereupon prepare and forward to the administration concerned a report containing its findings and recommendations for the solution of the problem.

7.3 In a case where, as a result of a study, the Board submits to one or more administrations suggestions or recommendations for the solution of a problem, and where no answer has been received from one or more of these administrations within a period of ninety days, the Board shall consider that the suggestions or recommendations concerned are unacceptable to the administrations which did not answer. If it was the requesting administration which failed to answer within this period, the Board shall close the study.

7.4 If it is requested by any administration, particularly by an administration of a country in need of special assistance, and if the circumstances appear to warrant, the Board, using such means at its disposal as are appropriate in the circumstances, shall render the following assistance:

a) computation necessary in the application of Annexes 1, 3 and 4;

b) any other assistance of a technical nature for completion of the procedures in this Appendix.

ARTICLE 8

The Plan for the Feeder Links for the Broadcasting-Satellite Service Utilizing the Fixed-Satellite Service in the Frequency Band 17.3-17.8 GHz in Region 2

(to be developed by the RARC)

ARTICLE 9

Interference

9.1 The Members of the Union in Region 2 shall endeavour to agree on the action required to reduce harmful interference which might be caused by the application of these provisions and the associated Plan.

ARTICLE 10

Entry into Force of the Final Acts of the Regional Broadcasting-Satellite Administrative Radio Conference, Geneva, 1983

10.1 These Final Acts shall enter into force on 1 January 1985 at 0001 hours UTC.

Note: Upon the inclusion of this provision in the Radio Regulations, this Article would be converted into a footnote against the title of the Appendix.

ARTICLE 11

Period of Validity of the Provisions and Associated Plan

11.1 The provisions and associated Plan have been prepared in order to meet the requirements for feeder links for the broadcasting-satellite service in the bands concerned for a period of at least fifteen years from 1 January 1985.

11.2 In any event, the provisions and associated Plan shall remain in force until their revision by a competent administrative radio conference convened in accordance with the relevant provisions of the Convention in force.

PART II Section 3

PROPOSED AMENDMENTS TO ARTICLES 8, 11, 13 AND 15 OF THE RADIO REGULATIONS ADDITION OF A NEW ARTICLE 15A

ARTICLE 8
TABLE OF FREQUENCY ALLOCATIONS

MOD

Region 1	Region 2	Region 3
11.7 - 12.5 FIXED BROADCASTING BROADCASTING-SATELLITE Mobile except aeronautical mobile	11.7 - 12.1 FIXED 837 FIXED-SATELLLITE (space-to-Earth) Mobile except aeronautical mobile 836 839 840	11.7 - 12.2 FIXED MOBILE except aeronautical mobile BROADCASTING BROADCASTING-SATELLITE 838 840
	12.1 ~~12.3~~ - 12.2 ~~FIXED 837~~ FIXED SATELLITE (space-to-Earth) ~~MOBILE except aeronautical mobile~~ ~~BROADCASTING~~ ~~BROADCASTING-SATELLITE~~ 836 839 840 ~~841~~ 842 ~~843~~ ~~844~~	12.2 - 12.5 FIXED MOBILE except aeronautical mobile BROADCASTING
838 840	~~12.3~~ - 12.2 - 12.7 FIXED MOBILE except aeronautical mobile BROADCASTING BROADCASTING-SATELLITE 839 840 842 ~~843~~ 844 846	838 840 845
12.5 - 12.75 FIXED-SATELLITE (space-to-Earth) (Earth-to-Space) 840 848 849 850	12.7 - 12.75 FIXED FIXED-SATELLITE (Earth-to-space) MOBILE except aeronautical mobile 840	12.5 - 12.75 FIXED FIXED-SATELLITE (space-to-Earth MOBILE except aeronautical mobile BROADCASTING-SATELLITE 847 840

MOD 836 In Region 2, in the band 11.7 - 12.2 ~~12.1~~ GHz, transponders on space stations in the fixed-satellite service may be used additionally for transmissions in the broadcasting-satellite service, provided that such transmissions do not have a maximum e.i.r.p. greater than 53 dBW per television channel and do not cause greater interference or require more protection from interference than the coordinated fixed-satellite service frequency assignments. With respect to the space services, this band shall be used principally for the fixed-satellite service. ~~The upper limit of this band shall be modified in accordance with the decisions of the 1983 regional administrative radio conference for Region 2 (see No. 841).~~

Article 8 (cont'd)

MOD 837 Different category of service: in Canada, Mexico and the United States, the allocation of the band 11.7 ~~12.2~~-12.1 GHz to the fixed service is on a secondary basis (see No. 424).

MOD 840 For the use of the band 11.7 - 12.75 GHz in Regions 1,2 and 3, see Resolutions ~~31~~, 34, ~~504~~, ~~700 and 701~~.

SUP 841

SUP 843

(MOD)844 In Region 2, in the band 12.2 ~~12.1~~ - 12.7 GHz, existing and future terrestrial radio-communication services shall not cause harmful interference to the space services operating in accordance with the broadcasting-satellite plan ~~to be~~ prepared at the 1983 regional administrative radio conference for Region 2, ~~and shall not impose restrictions on the elaboration of such a plan. The lower limit of this band shall be modified in accordance with the decisions of that conference for Region 2 (see No.841)~~

MOD 846 In Region 2, in the band 12.2 ~~12.3~~ - 12.7 GHz, assignments to stations of the broadcasting-satellite service made available in the plan ~~to be~~ established by the 1983 regional administrative radio conference for Region 2 may also be used for transmissions in the fixed-satellite service (space-to-Earth), provided that such transmissions do not cause more interference or require more protection from interference than the broadcasting-satellite service transmissions operating in accordance with that plan. With respect to the space services, this band shall be used principally for the broadcasting-satellite service. ~~The lower limit of this band shall be modified in accordance with the decisions of that conference for Region 2 (see No. 841).~~

Reason: The amendments to the Table and to the footnotes are consequential to the action envisaged in No. 841 and to the Canadian proposal to place the lower limit of the broadcasting-satellite band at 12.2 GHz for Region 2.

MOD 869 In Regions 1 and 3 the use of the band 17.3-18.1 GHz by the fixed-satellite (Earth-to-space) service is limited to feeder links for the broadcasting-satellite service. In Region 2 the use of the band 17.3-17.8 GHz by the fixed-satellite (Earth-to-Space) service is reserved for satellite systems using the 12.2-12.7 GHz band in the Space-to-Earth direction.

Reason: To recognize that the planning of the feeder links for the broadcasting satellite service between 17.3-17.8 GHz as per the Canadian proposed Appendix 30A is directly associated with the planning of the down-links between 12.2-12.7 GHz as per Appendix 30.

ARTICLE 11

Coordination of Frequency Assignments to Stations in a Space Radiocommunication Service Except Stations in the Broadcasting-Satellite Service and to Appropriate Terrestrial Stations[1]

MOD A.11.1 [1]For the coordination of frequency assignments to stations in the broadcasting-satellite service and other services in the frequency bands 11.7-12.2 GHz (in Regions ~~2 and~~ 3), and 11.7 - 12.5 GHz (in Region 1) and 12.2-12.7 GHz (in Region 2) as well as the coordination of frequency assignments to feeder link stations utilizing the fixed-satellite service (Earth-to-space) in the frequency band 17.3-17.8 GHz (in Region 2) and other services in this band, see also Article 15 and Article 15A respectively.

Reasons: To align the 12 GHz frequency bands mentioned in Articles 11, 12, 13 and 15 with Article 8 of the Radio Regulations and to take into account the proposed procedures that would be applicable to the use (in Region 2) of the fixed-satellite service (Earth-to-Space) in the band 17.3-17.8 GHz for feeder links associated with the broadcasting-satellite service.

ARTICLE 12

MOD Title Notifications and Recording in the Master International Frequency Register of Frequency Assignments[1] to Terrestrial Radiocommunication stations[2,3,4]

MOD A. 12.3 [3]For the notification and recording in of frequency assignments to terrestrial stations in the frequency bands 11.7 - 12.2 GHz (in Regions ~~2 and~~ 3), 12.2-12.7 GHz (in Region 2) and 11.7 - 12.5 GHz (in Region 1), so far as their relationship to the broadcasting-satellite service in these bands is concerned, see also Article 15.

ADD A.12.4 [4]For the notification and recording of frequency assignments to terrestrial stations in the frequency band 17.7 - 17.8 GHz (in Region 2), so far as their relationship to the fixed-satellite service (Earth-to-space) in this band is concerned, see also Article 15A.

Reason: Refer to the reason given under Article 11

ARTICLE 13

Notification and Recording in the Master International Frequency Register of Frequency Assignments[1] to Radio Astronomy and Space Radiocommunication Stations Except Stations in the Broadcasting-Satellite Service[2]

MOD A.13.2 [2]For notification and recording of frequency assignments to stations in the broadcasting-satellite service and other services in the frequency bands 11.7-12.2 GHz (in Regions ~~2~~

Article 13 (cont'd)

~~and~~ 3) and 11.7 - 12.5 GHz (in Region 1) and 12.2 - 12.7 GHz (Region 2), as well as the notification and recording of frequency assignments to feeder link stations in the fixed-satellite service (Earth-to-space) in the frequency band 17.3 - 17.8 GHz (in Region 2) and other services in this band, see also Article 15 and Article 15A respectively.

Reason: Refer to the reason given under Article 11.

ARTICLE 15

MOD Title Coordination, Notification and Recording of Frequency Assignments to Stations of the Broadcasting-Satellite Service in the Frequency Bands 11.7 - 12.2 GHz (in Regions ~~2 and~~ 3) 12.2 - 12.7 GHz (in Region 2) and 11.7 - 12.5 GHz (in Region 1) and to the Other Services to Which these Bands Are Allocated, so Far as their Relationship to the Broadcasting-Satellite Service in these Bands is Concerned

MOD 1656 ~~The provisions and associated Plans for the broadcasting-satellite service in the frequency bands 11.7 - 12.2 GHz (in Region 2 and 3) and 11.7 - 12.5 GHz (in Region 1) adopted by the World Broadcasting-Satellite Administrative Radio Conference, Geneva, 1977 as contained in Appendix 30~~

The provisions and associated Region 1 and 3 Plan for the broadcasting-satellite service in the frequency band 11.7- 12.5 GHz (in Region 1) and 11.7 - 12.2 GHz (in Region 3) adopted by the World Broadcasting-Satellite Administrative Radio Conference, Geneva, 1977 and the provisions and associated Region 2 Plan for the broadcasting-satellite service in the frequency band 12.2 - 12.7 GHz adopted by the Regional Broadcasting-Satellite Administrative Radio Conference, Geneva, 1983 as contained in Appendix 30 shall apply to the assignment and use of frequencies by stations of the broadcasting-satellite service in these bands and to the stations of other services to which these bands are allocated so far as their relationship to the broadcasting-satellite service in these bands is concerned.

Reason: Refer to the reason given under Article 11; also to re-arrange the wording of the text of 1656 for clarification purposes.

ADD

ARTICLE 15A

Title Coordination, Notification and Recording of Frequency Assignments/Allotments applicable to Stations in the Fixed-Satellite Service (Earth-to-space) in the band 17.3 - 17.8 GHz (Region 2) providing feeder links for the broadcasting-satellite service and applicable also to stations of other Services to which this band is allocated, so far as their relationship to the Fixed-Satellite Service (Earth-to-space) in this band is concerned.

1668 The provision and associated Plan adopted by the Region 2 Broadcasting-Satellite Administrative Radio Conference, (Geneva, 1983), for feeder links for the broadcasting-satellite service utilizing the Fixed-Satellite Service (Earth-to-space) in the band 17.3-17.8 GHz (Region 2) as contained in Appendix 30A, shall apply to the assignment/allotment and use of frequencies by feeder links in this band and to stations of other services to which this band is allocated so far as the relationship of these other services to the Fixed-Satellite Service (Earth-to-space) in this band is concerned.

Reason: Refer to the reason given under Article 11

Part III

TECHNICAL PROPOSALS

PART III - Section 1: INTRODUCTION TO THE TECHNICAL PROPOSALS

The Canadian proposals for the technical annexes for the Region 2 Plan are built around the existing provisions of Appendix 30 with a similar set of annexes for the proposed new Appendix 30A. There has been a concerted effort to incorporate the required Region 2 changes to the annexes of Appendix 30 in a manner which would cause the least disruption to the technical characteristics of the Regions 1 and 3 Plan. By using this approach, as detailed in the following Section, the RARC will be able to develop a complete set of annexes which will form part of the Final Acts and a Regional Agreement, and at the same time be in a format which should be readily incorporated into the Radio Regulations by the WARC-ORB-85.

The texts proposed in the following sections are the result of a concentrated review of the findings of the CCIR/CPM report and completion of additional Canadian technical studies. An effort has been made to meet the concerns raised by other administrations in the Region in various preparatory meetings. This process will continue up to and even during the Conference in order to reach a consensus on a baseline system which will be used as a basis for planning.

Some of the key elements of these proposals are:

- the alignment of Annexes 4 and 5 to meet the inter-regional provisions of Resolutions 31 and 701,
- simplified propagation information in dual formats: families of curves for manual calculations, or a series of equations for computer application,
- new antenna pattern for a receiving earth station,
- a reasonable value of downlink G/T, with a subsequently revised value of required pfd,
- several feeder link parameters are proposed, such as, a nominal size earth station antenna, a maximum antenna input power, the use of site diversity, power control, and automatic gain control, etc.,
- sharing with other services, especially in the 17.7-17.8 GHz band, and
- system telemetry, tracking and telecommand considerations.

Development of these proposals has specifically taken into consideration the needs for some types of improved television distributions systems without unduly affecting the baseline system characteristics for standard television systems. This accommodation is predicted on the principle that such advanced systems should be permitted as long as they do not impact negatively on the capacity available in the plan to other administrations.

Finally, as noted in the following pages, there are specific areas of the annexes where proposals have not yet been finalized. Formulation of these proposals is expected to be completed shortly.

PART III - Section 2:

MODIFIED
TECHNICAL ANNEXES
TO
APPENDIX 30
FOR REGION 2

Note: All reasons and source references should be suppressed in the production of the final document by the RARC.

APPENDIX 30

ANNEX 1

(MOD) Limits for Determining Whether a Service of an Administration is Considered to Be Affected by a Proposed Modification to ~~the~~ a Plan (Article 4, paragraph 4.3.1)[1]

Title Limits on the change in the wanted-to-interfering signals ratio with respect to frequency assignments in accordance with the Plan

MOD With respect to paragraph 4.3.1.1 of the Appendix, in the case of Regions 1 and 3 an administration shall be considered as being affected ....

ADD Similarily in the case of Region 2, an administration shall be considered as being affected if the effect of a proposed modification to this Plan would result in the overall protection margin[3] of its entry in the Plan falling below either 0 dB or the value resulting from the frequency assignments in the Plan at the date of entry into force the Final Acts[4], whichever is lower. This overall protection margin is calculated relative to the value of overall protection ratio[5].

NOC Note: In performing the calculation, the effect at the receiver input of all the co-channel and adjacent-channel signals is expressed in terms of one equivalent co-channel interfering signal. This value is usually expressed in decibels.

FOOTNOTES:

MOD [1]The limits specified in this Annex relate to the power flux-densities which would be obtained assuming ~~free-space~~ clear air propagation conditions.

NOC [2]Final Acts ....

ADD [3]The overall protection margin includes the equivalent co-channel values for both the space-to-earth path and the earth-to-space (feeder link) path for all interfering sources in the Plan including interference from other channels in the same service area.

ADD [4]Final Acts of the RARC-83-BSS, Geneva

ADD [5]The value of overall protection ratio is given in Section 3.4 of Annex 8 and Section 1.7 of Annex 9, both of this Appendix.

ANNEX 1 (cont'd)

Reason: As proposed in Annexes 8 and 9, a new value for the overall protection ratio is required based on the decisions of the CCIR/CPM (reference : section 5.1.7) and recent subjective assessment studies in Canada. Since a different value of protection ratio necessitates a new paragraph for Region 2, it seems more logical to use the concept of overall protection margin rather than wanted to interfering signal ratios as was done by Regions 1 and 3. Cross reference is made to the appropriate sections of Annexes 8 and 9.

MOD 2. Limits on the change in the power flux-density to protect the broadcasting-satellite service in the band 11.7- ~~12.2~~ 12.7 GHz, in Region 2 due to the Region 1 & 3 Plan, and in Regions 1 and 3 due to the Region 2 Plan

MOD With respect to paragraph 4.3.1.2 of the Appendix, an administration in ~~Region 2~~ shall be considered as being affected....

(MOD) where θ is the difference in degrees between the longitudes of the broadcasting-satellite space station in one Region ~~1 or 3~~ and the broadcasting-satellite space station affected in another Region ~~2~~.

Reason: Application of principle of reciprocity and Resolution 31, WARC-79. This section will now protect all broadcasting-satellite systems of all Regions from changes in the Plans.

3. Limits on the change in the power flux-density to protect the terrestrial services of other administrations

(MOD) With respect to paragraph 4.3.1.3 of the Appendix, an administration in Region 1 or 3 shall be considered as being affected if the consequence of the proposed modification to the Region 1 & 3 Plan is....

MOD An administration in Region 2 shall be considered as being affected by a proposed modification to the Region 1 and 3 Plan or an administration of Region 1 or 3 shall be considered as being affected by a proposed modification to the Region 2 Plan if the proposed modification to the Plan would result in exceeding....

FOOTNOTE

NOC [1]Final Acts....

Reason: To make provision reciprocal. Section now applies to all Regions and protects terrestrial services from a proposed modification to the Plan of another Region.

ANNEX 2

TITLE Basic Characteristics to Be Furnished in Notices Relating to Space Stations in the Broadcasting-Satellite Service [1]

NOC Item 1

MOD 2. Nominal orbital position (in degrees from the Greenwich meridian) For Region 2, specify the orbital position of the space station.

NOC Items 3 - 7

MOD 8. Rain-climatic zone(s)

NOC Items 9 - 11

MOD Item 12-add a new characteristic

- for beams other than elliptical or circular in shape, indicate the maximum gain of the space station transmitting antenna and the gain contours plotted on a map of the Earth's surface, preferably in a radial projection from the satellite on to a plane perpendicular to the axis from the centre of the Earth to the satellite. The isotropic or absolute gain for both polarizations at each contour which corresponds to a gain of 2, 4, 6, 10 and 20 dB and at 10 dB intervals thereafter, as necessary, below the maximum gain, shall be indicated. The gain contours of the space station transmitting antenna should also be provided in the form of a numerical equation or in tabular form to facilitate computer analysis;

Reason: Information is required by administrations to analyse the impact of a particular notice, and is based on Appendix 3 (Item D10 (a)) of Radio Regulations.

NOC Items 13 - 21

FOOTNOTE

ADD [1] In Region 2, notices relating to space stations and earth stations used for telemetry and tracking purposes associated with the Plan shall be furnished in accordance with Appendix 3 of the Radio Regulations.

ANNEX 3

MOD Method for Determining the Limiting Interfering Power Flux-Density at the Edge of a Broadcasting-Satellite Service Area in the Bands 11.7 - 12.2 GHz (in Regions ~~2 and~~ 3), 12.2-12.7 GHz (in Region 2), and 11.7 - 12.5 GHz (in Region 1) and for Predicting the Power Flux-Density Produced There by a Terrestrial Station

(Modifications To Be Supplied in Subsequent Proposals)

ANNEX 4

MOD Need for Coordination of a Fixed-Satellite Space Station ~~or a Broadcasting-Satellite Space Station in Region 2~~ with Respect to the Plans (Article 7)[1]

Reason: Consequential to change in Allocation Table at WARC-79

MOD With respect to paragraph 7.2.1 of the Appendix, coordination of a space station in the fixed-satellite service ~~or the broadcasting-satellite service of Region 2~~ is required when, under assumed free-space propagation conditions, the power flux-density on the territory of an administration in another Region ~~1 or Region 3~~ exceeds the value derived from the following expressions:

(values remain unchanged)

MOD θ = the difference in degrees between the longitude of the interfering ~~broadcasting-satellite or~~ fixed-satellite space station in one Region ~~2~~ and the longitude of the affected broadcasting-satellite space station in another Regions ~~1 and 3~~.

Reason: To align annex with changes in the Allocation Table at WARC-79 and make it universally applicable to fixed satellite systems in all Regions.

FOOTNOTE:

ADD [1]See paragraph 7.0 of Article 7 for details on the exact frequency bands in the three Regions covered by this Annex.

ANNEX 5

MOD Power Flux-Density Limits ~~Between 11.7 GHz and 12.2 GHz~~ to Protect the Terrestrial Services in Region 1 and 3 from Interference from Region 2 Broadcasting-Satellite Space Stations (Article 9)

MOD The power flux-density limits are as follows:
1) in the band 12.2 - 12.5 GHz, for all the territories of administrations in Region 1 and 3:

(values unchanged)

MOD 2) in the band 12.2 - 12.5 GHz, for territories of administrations in Region 3 and those in the western part of Region 1, west of longitude 30°E:

(values unchanged)

Reason: To incorporate the results of Resolution 31 (resolves 3) to protect Regions 1 and 3 terrestrial services in the band 12.2 - 12.5 GHz.

ANNEX 5 (cont'd)

ADD 3) in the band 12.5 - 12.7 GHz, for that part of Region 1 east of 30°E longitude, for the protection of terrestrial radio relay systems carrying television using AM/VSB modulation, calculated under clear air propagation conditions:

- 134 dB(W/m^2.5MHz) for angle of arrival (γ)=0°

- $134+12(\frac{\gamma}{\theta})^2$ dB(W/m^2.5MHz) for $0° \leq \gamma \leq \theta o/2°$

- $134+(10.5+25 \log (\gamma/\theta o))$ dB(W/m^2.5MHz) for $\gamma > \theta o/2°$

where: θo is the half-power beamwidth of the radio relay antenna with a mainbeam gain of 40.5 dBi, assumed to be 1.7 degrees.

Reason: To incorporate sharing agreements for the two services as developed at the CCIR/CPM, reference section 7.4.3.2.1 of that report, and CCIR Report 614.

SUP ANNEX 6

SUP ANNEX 7

Reason: These general principles were developed at WARC-77 for Region 2 in the context of equal sharing between FSS and BSS at 11.7-12.2 GHz. To the extent they are applicable to the 12.2-12.7 GHz band, they will be considered in planning of the BSS and do not need to be explicitly stated in the Final Acts.

ANNEX 8

Technical Data Used in Establishing the Provisions and Associated Plans and Which Should Be Used for their Application

1. DEFINITIONS

NOC 1.1 and 1.2

MOD 1.3 Beam area

Add the following sentence to the end of Note: In the case of Region 2, the corresponding value is 0.8 degrees in line with section 3.13.2 of this Annex.

Source: CCIR/CPM Report, section 2.3

NOC 1.4 Nominal orbital position

ADD 1.5 (Radio frequency) channel, (RF channel); Canal (radioélectrique),radiocanal, canal RF; Radiocanal, (Canal radioeléctrico)

Part of the radio spectrum intended to be used for an emission and which may be defined by two specified limits, or by its centre frequency and the associated bandwidth, or by any equivalent indication.

Source: Based on CCIR Report AC/CMV

ANNEX 8 (cont'd)

ADD 1.6 Adjacent channel:

The RF channel in the broadcasting-satellite service frequency plan, which is situated immediately higher or lower with respect to the frequency of the reference channel.

Source: CCIR/CPM Report, paragraph 2.3.2

2. RADIO PROPAGATION FACTORS

ADD a new sub-title:

For Administrations of Region 1 and 3:

NOC to remainder of existing section 2 except for the following clarification:

MOD Title of Figures 1 and 2, add a footnote: for data on Region 2, see section 2.4 of this Annex.

ADD a new sub-section covering propagation data needed for the Region 2 Plan:

For Administrations of Region 2:

2.4 The propagation loss on an earth-space path is equal to the free space path loss plus the atmospheric absorption loss plus the rain attenuation exceeded for 1% of the worst month.

2.4.1 Atmospheric absorption

The loss due to atmospheric absorption (i.e. clear-air attenuation) is given by:

$$A_a = 0.0726 \operatorname{cosec}^{\theta} \text{ dB at 12.5 GHz}$$
$$= 0.1126 \operatorname{cosec}^{\theta} \text{ dB at 17.5 GHz} \qquad \theta > 2^\circ \qquad (2.1)$$

where θ is the elevation angle of the earth station. The generalized formula valid above 0° elevation angle can be found in CCIR Rep.719-1

2.4.2 Rain attenuation

Figure 2-2 presents plots of rain attenuation, A_p, of circularly polarized signals exceeded for 1% of the worst month at 12.5 GHz, as a function of earth station latitude and elevation angle for each of the rain climates shown in Figure 2-1.

Alternatively, the following method can be used to calculate the rain attenuation, A_p, at a given location through the following steps:

ANNEX 8 (cont'd)

Step 1: The rain height, h_R, is obtained from:

$$h_R = \rho \left\{ 5.1 - 2.15 \log \left[1 + 10^{\left(\frac{\phi - 27}{25} \right)} \right] \right\} \text{ km} \qquad (2.2)$$

where the empirical height reduction factor, ρ, as a function of the absolute value of earth station latitude ϕ (degrees) is given by:

$\rho = 0.6$ $\quad \phi \leq 20°$

$\rho = 0.6 + 0.02(\phi - 20)$ $\quad 20° < \phi \leq 40°$

$\rho = 1.0$ $\quad \phi > 40°$

Step 2: The slant-path length, L, below the rain height is obtained from:

$$L = \frac{2(h_R - h_0)}{\left[\sin^2 \theta + 2 \frac{(h_R - h_0)}{R_e} \right]^{\frac{1}{2}} + \sin \theta} \quad \text{km} \qquad (2.3)$$

where h_o (km) is the height above mean sea level of the earth station, R_e is the effective radius of the Earth (8500 km), including refraction, and h_R was calculated from equation 2.2.

Step 3: The reduction factor, r, for 0.01% of the time is calculated from:

$$r = \frac{90}{90 + 4L \cos \theta} \qquad (2.4)$$

Step 4: Obtain the value of rain intensity R (exceeded for 0.01% of an average year) from Table 2-1 for the rain climates identified in Fig. 2-1. Note: step 7 will adjust these values to correspond to 1% of the worst month.

Step 5: Obtain the specific attenuation γ_R (dB/km) for circular polarization from:

$$\gamma = 0.0202 \, R^{1.198} \quad \text{at 12.5 GHz}$$

$$\gamma = 0.0520 \, R^{1.114} \quad \text{at 17.5 GHz} \qquad (2.5)$$

Step 6: The attenuation exceeded for 0.01% of an average year is then obtained from:

$$A_{0.01} = \gamma L r \quad \text{dB} \qquad (2.6)$$

Step 7: The attenuation exceeded for 1% of an average worst month is then estimated from the attenuation to be exceeded for 0.01% of an average year by using:

$$A_p = 0.19 \, A_{0.01} \qquad (2.7)$$

ANNEX 8 (cont'd)

2.5 Rain and ice can cause depolarization of radio frequency signals. The level of the co-polar component relative to the depolarized component is given by the cross-polarization discrimination (XPD) ratio. For circularly polarized emissions, the XPD ratio not exceeded for 1% of the worst month is obtained from:

$$XPD = 33 - 40 \log(\cos\theta) - 20 \log A_p \quad dB, (5^0 \leq \theta \leq 60^0) \quad (2.8)$$

where A_p (dB) is the co-polar rain attenuation exceeded for 1% of the worst month (calculated in section 2.4) and θ is the elevation angle. For angle of θ greater than 60°, use $\theta = 60°$ in equation (2.8).

TABLE 2-1 Rainfall Intensity ($R_{0.01}$) Exceeded For the Rain Climatic Zones (Fig. 2-1)

Zone	A	B	C	D	E	F	G	K	M	N	P
(mm/h)*	8	12	15	19	22	28	30	42	63	95	145

* Based on 0.01% of time. (This value is used for intermediate calculations).

Reasons: This addition to the section on propagation is based on sections 3.2.3 - 3.2.6 of the CCIR/CPM report. An attempt has been made to simplify the presentation of the equations by making them uniquely applicable to RARC-83 frequency bands. In addition, a graphical presentation is provided to assist those who do not require a precise answer.

The constant term in equation 2.7 has been modified from that contained in the CPM report as a result of subsequent Canadian studies. The model adopted at the CPM was compared to measured data in the Region and the model was found to over-estimate the measured rain attenuation by about 30%. The new value provides better correlation between the measured and predicted data.

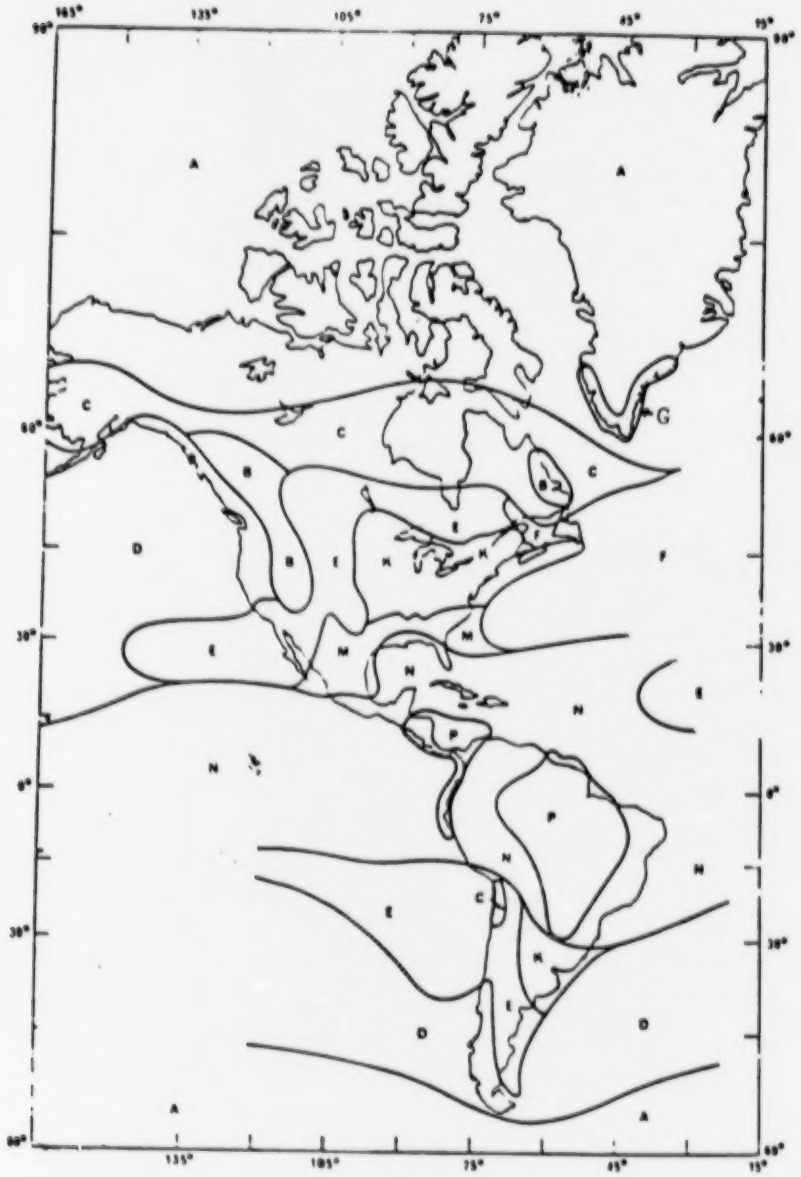


FIGURE 2-1 - Rain climatic zones (Region 2)

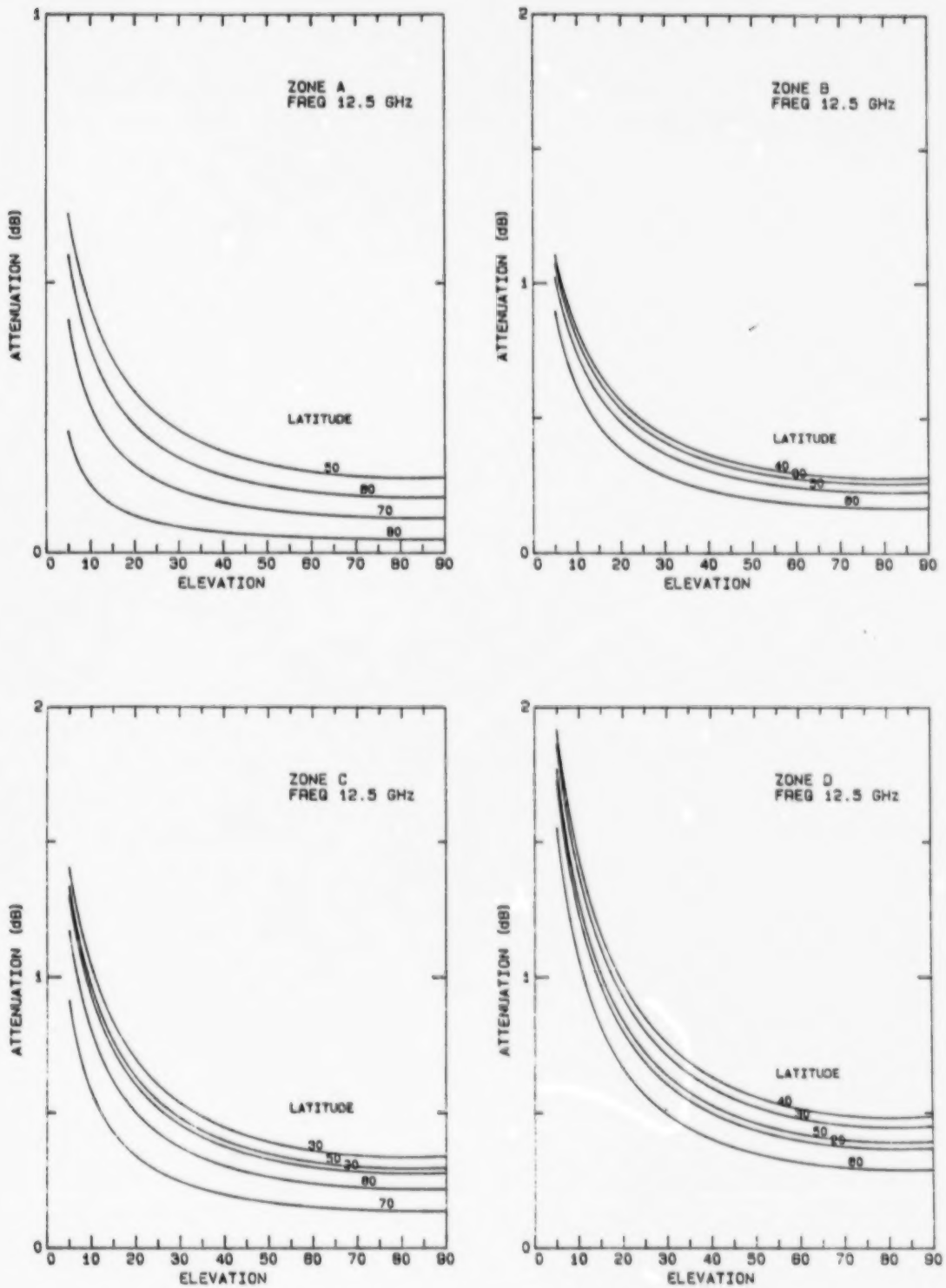


FIGURE 2-2 Rain attenuation, A_p, for the rain climatic zones of Region 2 as a function of latitude and elevation angle. (Circular polarization , 1% of the worst month, at 12.5GHz)

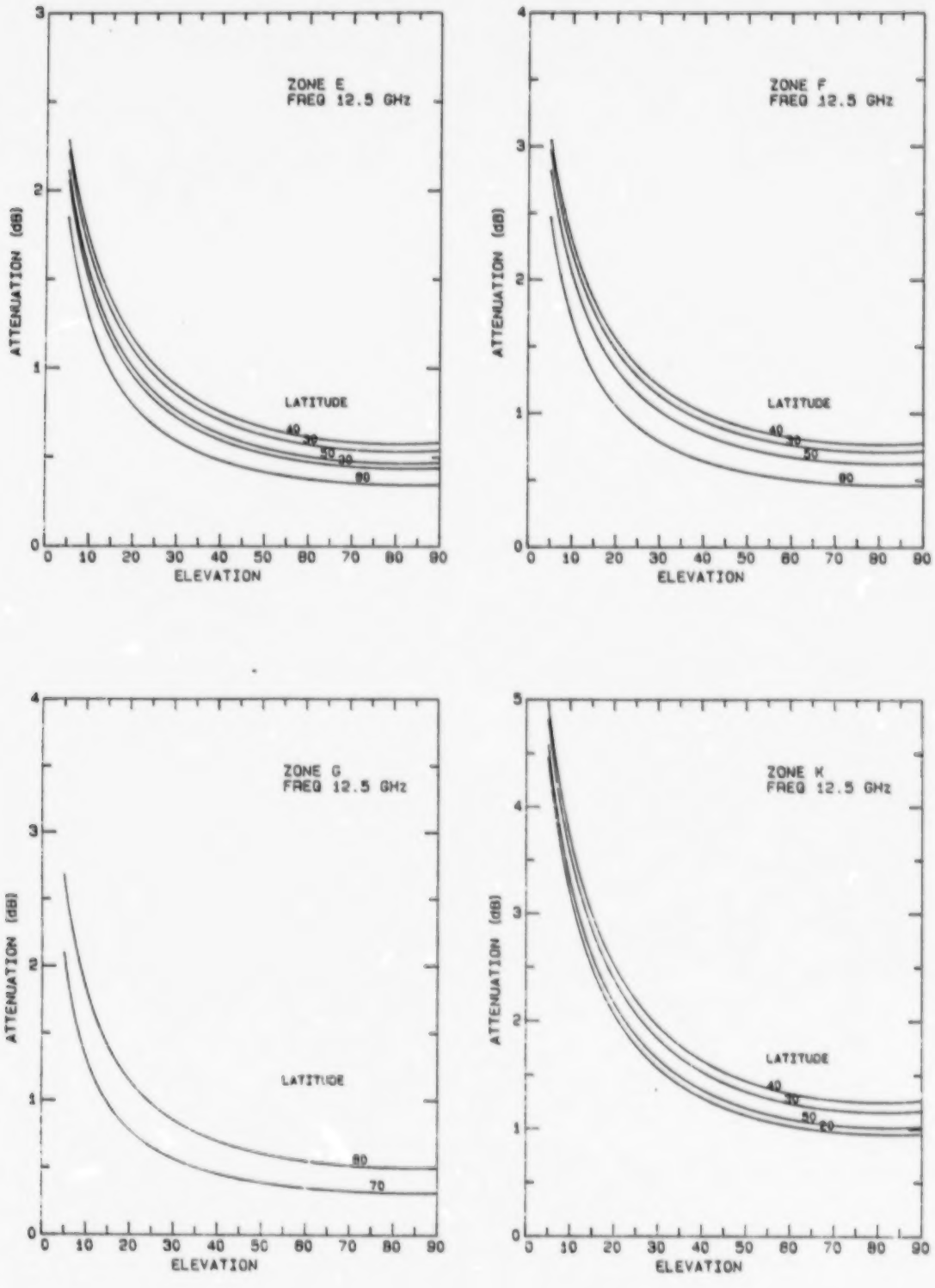
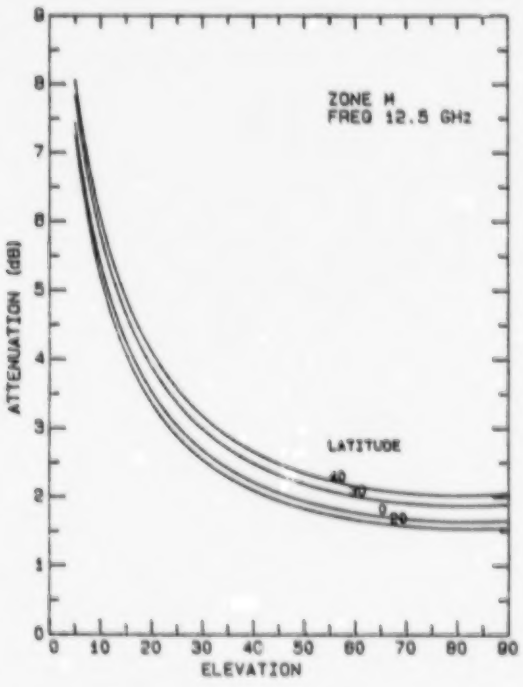
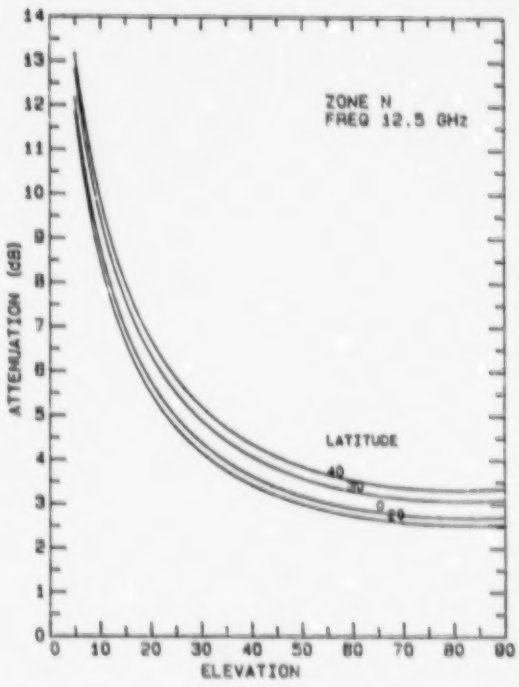


FIGURE 2-2 (Continued)





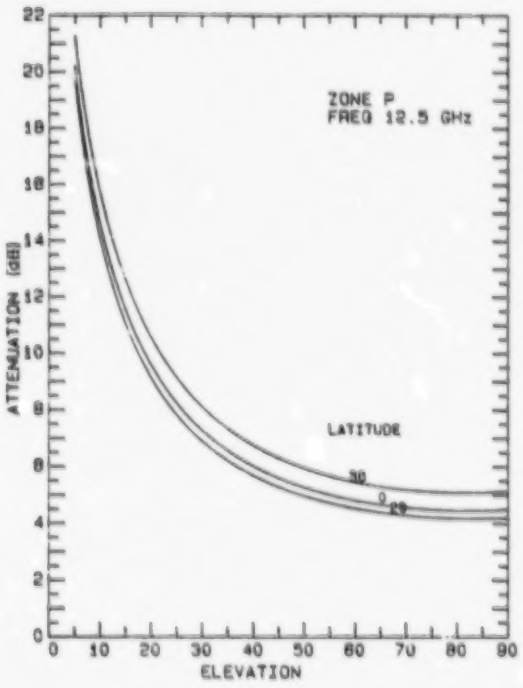


FIGURE 2-2 (Continued)

3. BASIC TECHNICAL CHARACTERISTICS

MOD 3.1 Type of Modulation

Add the following sentence to the end of the final paragraph:
For Region 2, two such sub-carriers are assumed.

NOC 3.2.1 and associated footnote

MOD 3.2.2 If possible, the polarization of different beams intended to serve the same area should be the same (Region 1 and 3).

NOC 3.2.3

MOD 3.3 Carrier-to-noise ratio

For the purpose of planning the broadcasting-satellite service, the carrier-to-noise ratio is equal to 14 dB for 99% of the worst month. However, for Region 2, the carrier-to-noise ratio including the feeder link and downlink contributions is equal to 12 dB for 99% of the worst month.

The reduction in quality in the down-link due to thermal noise in the up-link is taken as equivalent to a degradation in the down-link carrier-noise ratio not exceeding 0.5 dB for 99% of the worst month. In Region 2, as guidance in the development of its Plan, the feeder link contribution is assumed to be in the order of 0.5 dB.

MOD 3.4 Protection ratio between two FM television signals
(Currently under review and will be addressed in a later proposal)

MOD 3.5.1 Channel Spacing in the Plan

The spacing between the assigned frequencies of two adjacent channels in the Regions 1 and 3 Plan is 19.18 MHz. The Plan gives the assigned frequencies for each channel. In the Region 2 Plan, the spacing between the assigned frequencies of two adjacent channels is 13-15 MHz.

(Note: a single value will be proposed later based on the result of further Canadian studies).

NOC 3.5.2 and 3.5.3

MOD 3.6 Figure of merit (G/T) of a receiving installation in the broadcasting-satellite service

In planning the broadcasting-satellite service for Regions 1 and 3 the value of the figure of merit G/T used is:

6 dB/K for individual reception:
14 dB/K for community reception.

Similarly, for Region 2 the figure-of-merit (G/T) used is 10 dB(K^{-1}) for individual reception.

(The remainder of this sub-section unchanged)

Reason: See Attachment B for information on this proposal.

ANNEX 8 (cont'd)

3.7.1 Minimum diameter of receiving antennae

MOD sub-paragraph (a) as follows:
a) for individual reception: 2° in Regions 1 and 3, ~~1.8°~~ 1.7° in Region 2;

Reason: Consequential to the 500 MHz shift in frequency from 11.7-12.2 GHz (1977) to 12.2-12.7 GHz (1979).

3.7.2 Receiving antenna reference patterns

NOC sub-paragraph (a) and figure 4

NOC sub-paragraph (b) but replace associated figure 5 with a new figure:

Reason: An update of Region 2 patterns for a receiving earth station antenna based on results of the CCIR/CPM (reference: section 5.1.10.3) and additional studies conducted in Canada). See Attachment A to this Annex for additional information.

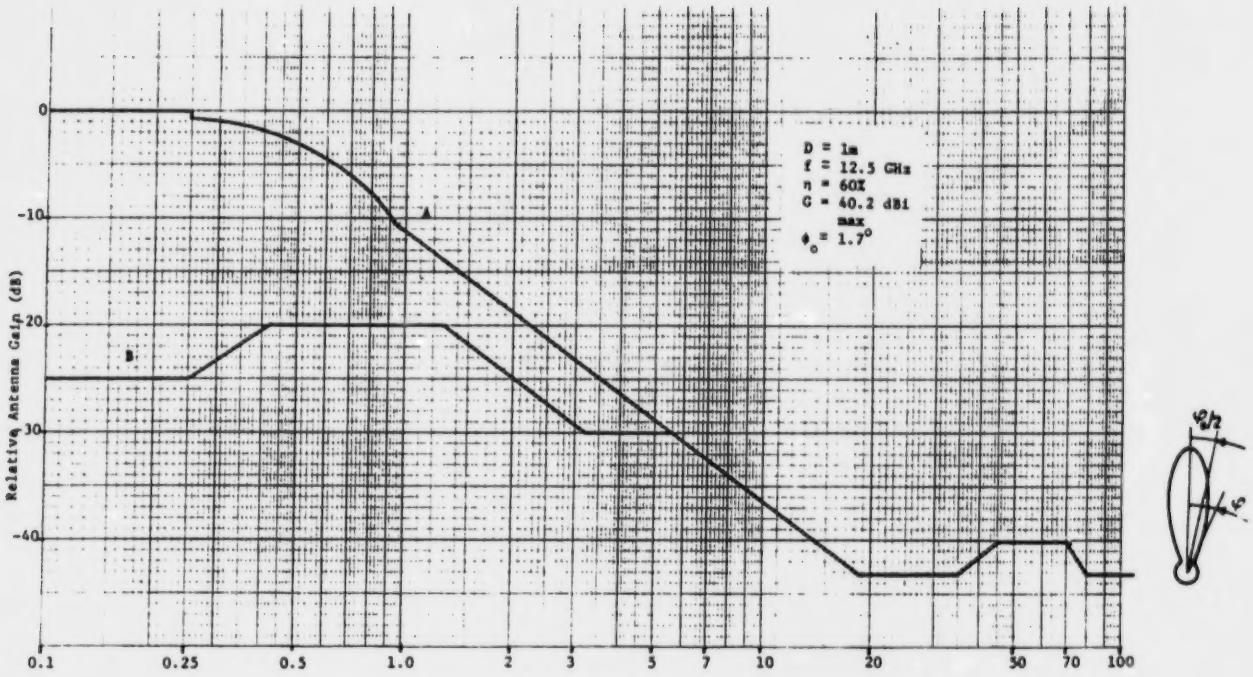


Figure 5

Reference patterns for co-polar and cross-polar components for earth station receiving antennae in Region 2

Curve A: Co-polar component (dB relative to main beam gain)

0	for $0 \leq \phi/\phi_o \leq 0.25$
$-12\ (\phi/\phi_o)^2$	for $0.25 < \phi/\phi_o \leq 0.94$
$-\{11.3+25 \log (\phi/\phi_o)\}$	for $0.94 < \phi/\phi_o \leq 18.88$
-43.2	for $18.88 < \phi/\phi_o \leq 35$
$-\{85.2-27.3 \log (\phi/\phi_o)\}$	for $35 < \phi/\phi_o \leq 45$
-40.2	for $45 < \phi/\phi_o \leq 70$
$-\{-55.2 + 51.7 \log (\phi/\phi_o)\}$	for $70 < \phi/\phi_o \leq 80$
-43.2	for $80 < \phi/\phi_o \leq 105.9$

Curve B: Cross-polar component (dB relative to main beam gain)

-25	for $0 \leq \phi/\phi_o \leq 0.25$
$-\{30+40 \log \lvert \phi/\phi_o-1 \rvert\}$	for $0.25 < \phi/\phi_o \leq 0.44$
-20	for $0.44 < \phi/\phi_o \leq 1.28$
$-\{17.3+25 \log (\phi/\phi_o)\}$	for $1.28 < \phi/\phi_o \leq 3.22$
-30	until the intersection with the co-polar component; then as the co-polar component.

Note 1: The flat portion of the curves up to $\phi/\phi_o = 0.25$ takes account of the pointing error of the antennae

Note 2: These patterns should determine the levels exceeded by 10% of the sidelobe peaks beyond the first sidelobe

ANNEX 8 (cont'd)

MOD 3.8 Necessary Bandwidth

The necessary bandwidths considered are as follows for:

- 625-line systems: 27 MHz;
- 525-line systems in Region 3: 27 MHz;
- ~~525-line~~ systems M, and N of Region 2: ~~18 MHz and 23~~ 24 MHz.

Reason: A minimal increase over that identified at WARC-77 to permit the inclusion of more audio channels and higher definition television transmission systems. A necessary bandwidth of 24 MHz will accommodate all television systems of the Region with 4.2 MHz of baseband video bandwidth.

3.9 Guardbands

NOC 3.9.1

(MOD) 3.9.2 For the planning of the broadcasting-satellite service in the band 11.7-12.5 GHz, the guardbands necessary....

ADD 3.9.2 A In planning for Region 2 in the band 12.2-12.7 GHz, the following guardbands have been used:

- at the lower band edge 12.2 GHz, 9 MHz
- at the upper band edge 12.7 GHz, 12 MHz.

NOC 3.9.3

ADD 3.9.4 However, for the administrations of Region 2, the guard bands shall be maintained as given in 3.9.2 A regardless of any decrease in e.i.r.p. levels in order to provide sufficient spectrum for Telemetry, Tracking, and Telecommand frequencies in these guardbands.

Reason: The subject of guard bands is addressed in section 7.6.3 of the CCIR/CPM report which points out that the guard bands of paragraph 3.9.2 are valid only to the Regions 1 and 3 plan, i.e. for the band edges at 11.7 GHz, and 12.2 GHz or 12.5 GHz (as appropriate).

The Region 2 situation is quite different since

- BSS e.i.r.p. levels are less than the Regions 1 and 3 plan,
- FSS systems below 12.2 are generally less sensitive to interference than those studied below 11.7 GHz (i.e. INTELSAT),
- FSS systems above 12.7 GHz seem to be even more sensitive to interference,
- the large e.i.r.p. of terrestrial systems operating immediately above 12.7 GHz may saturate BSS earth station receivers causing excessive interference if sufficient a guard band is not provided, and
- the use of the guard bands for telemetry, tracking and telecommand must also be considered.

Thus it was felt necessary to maintain the total guard band bandwidth at the present size and provide greater separation at the upper edge, 12.7 GHz.

ANNEX 8 (cont'd)

MOD 3.10 Orbital Spacing

Add the following sentence at the end of the existing text:

The Plan for Region 2 has been based on a non-uniform spacing.

MOD 3.11 Satellite station keeping

Add the following sentence to the end of this paragraph:

For such space stations in Region 2, the maintenance of this tolerance in the N-S direction is advisable but is not a requirement.

Reason: Only east-west station keeping is important from the viewpoint of inter-system interference and planning and thus the longitude variation should be limited to $^{+}/_{-}0.1$ degree. The north-south variation should not be taken into account when planning since it is an intra-system problem. Thus it should be left to the system designer to specify.

(MOD)3.12 Elevation angle of receiving antennae

The Plans ~~has~~ have been based on the consideration of a minimum angle of elevation of 20° to minimize the required e.i.r.p. of the satellite and to reduce the effects of shadowing and the possibility of interference from terrestrial services. However, for areas situated in latitudes above about 60°, the angle of elevation is of necessity less than 20°. Attention is also directed to paragraph 2.2 and 2.5.

(The remainder unchanged)

3.13 Transmitting antennae

NOC 3.13.1

MOD 3.13.2 Minimum beamwidth of transmitting antenna

A minimum value of 0.6° for the half-power beamwidth of a transmitting antenna has been agreed on for planning for Regions 1 and 3, whereas for Region 2, the corresponding value agreed upon is 0.8 degrees

MOD 3.13.3 Transmitting antenna reference patterns

The reference patterns for the co-polar and cross-polar components of satellite transmitting antennae used in preparing the Plan are given in Fig. 6 for the Regions 1 and 3 Plan. For the Region 2 Plan, the reference patterns are given in fig. 6-1.

MOD the title to figure 6 to read:
Reference patterns for co-polar and cross-polar components for satellite transmitting antennae for the Regions 1 and 3 Plan.

ADD new figure 6-1
(New figure 6-1 will be supplied in subsequent Canadian proposals).

ANNEX 8 (cont'd)

3.14 Pointing accuracy of satellite antennae

MOD 3.14.1 The deviation of the antenna beam from its nominal pointing direction must not exceed a limit of 0.1° in any direction. Moreover, the angular rotation of a transmitting beam about its axis must not exceed a limit of $\pm 2°$; this latter limit is not necessary for beams of circular cross-section using circular polarization. However, for Region 2, this angular rotation must not exceed $+/-1°$.

Source: CCIR/CPM Report, section 4.2.4.2

Reason: To limit impact of space station antenna pointing errors on the enlargement of the antenna beam size and footprint. The suggested value is well within present day technology.

NOC 3.14.2 - 3.15

MOD 3.16 Power flux-density at edge of coverage area

The value of the power flux-density at the edge of the coverage area for 99% of the worst month is:

- 103 dB(W/m^2) for individual reception in Region 1 and 3;
- ~~105~~ -109 dB(W/m^2) for individual reception in Region 2;
- 111 dB(W/m^2) for community reception in all Regions.

Reason: Consequential to earlier Canadian proposals for C/N, G/T and bandwidth.

NOC 3.17

MOD 3.18 Use of energy dispersal

For planning in Regions 1 and 3, an energy dispersal value has been adopted which reduces by 22 dB the spectral power flux-density measured in a 4 kHz bandwidth in relation to that measured in the entire bandwidth; this reduction corresponds to a peak-to-peak deviation of 600 kHz.

However, for planning in Region 2, there is no need to use energy dispersal on the downlink except as required in exceptional cases to meet the inter-Regional criteria of Annex 5, with the above values.

Reason: The use of energy dispersal is required only in situations where the inter-regional sharing criteria cannot be met without its use.

ATTACHMENT A TO ANNEX B, APPENDIX 30 *

Reference Radiation Pattern for Earth Station Receive Antennas

One of the reference radiation patterns proposed by the CPM Report (fig. 5-6) sets the level of 90% of the back lobes of receive antennas at a level of -43.2 dB or $-3dB_i$ for a planning diameter of antenna of 1m and an efficiency of 60%.

This level is believed to be difficult to achieve in practice primarily because of main antenna spill over which occurs at angles greater than about 100 degrees depending on the antenna design.

This problem was studied on the basis of the statistical data on sidelobe patterns submitted to the CPM by Canada for high efficiency center fed antennas (document A 23) and on the basis of the little data available on the worst case side lobe peaks of offset fed antennas of 0.75 m and 1m.

The data shows that a relaxation of 3 dB of the reference radiation in a specific area of the back lobe region is necessary to accommodate 90% of the sidelobe peaks of the center fed antennas and to accommodate the worst case sidelobes of offset fed antennas.

It is therefore recommended to adopt a revised reference radiation pattern, with an increase of 3 dB in the backlobe region from about 80 degrees to 135 degrees.

The new reference pattern for the co-polar component given in dB relative to the maximum gain is given by

$G =$	0	for		$\phi/\phi_o \leq$	0.25
$=$	$-12\ (\phi/\phi_o)^2$	for	0.25	$< \phi/\phi_o \leq$	0.94
$=$	$-[11.3 + 25 \log(\phi/\phi_o)]$	for	0.94	$< \phi/\phi_o \leq$	18.88
$=$	-43.2	for	18.88	$< \phi/\phi_o \leq$	35
$=$	$-[85.2 - 27.3 \log(\phi/\phi_o)]$	for	35	$< \phi/\phi_o \leq$	45
$=$	-40.2	for	45	$< \phi/\phi_o \leq$	70
$=$	$-\{-55.2 + 51.7 \log(\phi/\phi_o)\}$	for	70	$< \phi/\phi_o \leq$	80
$=$	-43.2	for	80	$< \phi/\phi_o \leq$	105.9

assuming a 1m diameter and an antenna efficiency of 60% for planning

* This background paper is provided for information only and should not be included in this Appendix.

Attachment B to Annex 8, Appendix 30*

Derivation of earth station

figure-of-merit (G/T)

The calculation of the figure-of-merit (G/T) for a receiving earth station can be done using the equation of section 3.6 of this Annex. Further details can be found in the CCIR/CPM report and CCIR Report 473-3.

$$G/T = \frac{\alpha \beta G_r}{\alpha Ta + (1-\alpha) Ta + (n-1) To} \qquad dB(K^{-1})$$

The values for the parameters of this equation are:

α: the efficiency of the feed between the antenna feed structure and the input of the low noise receiver. For the design where the first stage amplifier is at the focal point of the reflector, as used in many low cost designs including the Canadian Anik B projects, the efficiency is very high and $\alpha = 0.975$;

β: the factor which takes into account the antenna mis-pointing and ageing of the receiver system. As reported to CCIR, β might be as low as 0.590 (ie. -2.3 dB) for earth station receivers in the 1 metre class.

G_r: the receiver antenna gain as given by the expression:

$$G_r = 20.5 + 10 \log \eta + 20 \log f_{GHz} + 20 \log D \qquad dBi$$

where:

η is the antenna efficiency. The Anik B low-cost earth stations have efficiency values as high as 70%. However, efforts to improve antenna sidelobe rejection may reduce this value somewhat. Thus, a value of 60% is used consistant with Canadian experience.

f is the frequency in GHz; the centre of the frequency band 12.5 GHz is used.

D is the antenna diameter in metres; a diameter of 1 m is used

Thus, the gain $G_r = 40.2$ dBi or 10,471

* This background paper is provided for information only and should not be included in this Appendix.

Ta: the effective temperature of the antenna, the contribution due to the background. In clear-air conditions Ta will be quite low in the order of 30K depending on the elevation angle. However, during heavy rain conditions Ta will increase significantly. A value of 150K is frequently used.

To: the reference noise temperature = 290K

n: the overall noise figure (expressed as a power ratio) of the receiving system. Canadian low-cost earth stations commonly have noise figures of 4.5dB. Noise figures in the range 3.4 - 3.6 dB have been reported by France and Japan to the CCIR. Based on these advances and the expected future developments, it is expected that receiver noise figures of 4.0 dB will be common by the mid-1980s and so will be used here. Therefore, n = 4.0 dB or 2.51 as a power ratio.

Based on the values of these parameters, then the G/T would be calculated:

$$G/T = \frac{0.975 \times 0.590 \times 10{,}471}{0.975 \times 150 + (1-0.975)\ 290 + (2.51-1)\ 290}$$

$$\therefore G/T = 10.1\ \text{dB}(K^{-1})$$

This value of G/T would seem to be a reasonable value for planning since it represents a good balance between current technology and expected advances that are yet to be proved in terms of full scale production techniques. It should be noted that this value of G/T contains a β factor of 2.3 dB for mis-pointing, polarization mis-alignment, and ageing. This may be considered somewhat conservative and might be an area for future improvements to give an effectively higher G/T.

PART III - Section 3:

TECHNICAL ANNEXES
FOR
APPENDIX 30A

Note: All reasons and source references should be supressed in the production of the final document by the RARC.

APPENDIX 30A

ANNEX 1

Limits for determining whether a service of an administration is considered to be affected by a proposed modification to the Plan (Article 4, Paragraph 4.3.1)

1. Limits on the change in the wanted-to-interfering signal ratio with respect to frequency assignments in accordance with the Plan.

With respect to paragraph 4.3.1.1 of this Appendix, an administration shall be considered as being affected if the effect of the proposed modification to the Plan would result in the protection margin at any point within the service area or a point specified in the Plan (associated with any of its frequency assignments in the Plan) falling below a value which would cause the overall protection margin[1] to fall below either 0 dB or the value resulting from frequency assignments in the feeder link and downlink plans[2], whichever is lower.

The assessment of interference into the broadcasting satellite system shall be based on the acceptability of the overall protection margin. The acceptability of a particular modification to a protection margin of a feeder link shall be based solely on the impact on the associated overall protection margin.

The values of protection margin for the feeder link used in planning is calculated relative to values contained in Annex 5.

Note: In performing the calculation, the effect at the receiver input of all co-channel and adjacent-channel signals, compared to their respective planned protection ratios, is expressed in terms of one equivalent co-channel protection margin. The value is usually expressed in decibels.

---

[1] The overall protection margin includes the equivalent co-channel protection margins for both the space-to-earth path and the feeder link for all interfering sources in the Plan including interference from other frequency assignments in the same service area.

[2] For the purposes of this Annex, the downlink plan shall be considered as being the associated Region 2 plan for the Broadcasting Satellite Service in the band 12.2 - 12.7 GHz (see Appendix 30).

ANNEX 1 (cont'd)

2. Limits on a change in the Plan as it affects a frequency assignment to a station in the Fixed Satellite Service.

With respect to paragraph 4.3.1.2 of this Appendix, an administration shall be considered as being affected if, upon application of the procedures of Appendix 28 as described in Annex 3, that administration is included in the coordination area of the frequency assignment to a transmitting feeder link earth station.

In such a case, the interference shall be assessed with respect to frequency assignment(s) to a receiving earth station in the Fixed Satellite Service operating in the band 17.7 - 17.8 GHz, which has been recorded in the Master Register or is in the process of being coordinated under provisions of No. 1060 of the Radio Regulations.

For the purpose of such a determination, the appropriate parameters of the transmitting feeder link earth station and the procedures given in Annex 3 of this Appendix, shall be used.

3. Limits on a change to the Plan as it affects a frequency assignment to a terrestrial station

With respect to paragraph 4.3.1.3 of this Appendix, an administration shall be considered as being affected if, upon application of the procedures of Appendix 28 as described in Annex 4, that administration is included in the coordination area of the frequency assignment to a transmitting feeder link earth station.

In such a case, the interference shall be assessed with respect to terrestrial stations operating in the band 17.7 - 17.8 GHz.

For the purpose of such a determination, the parameters of the transmitting feeder link earth station, as modified from those parameters given in Annex 5 of this Appendix, shall be used.

ANNEX 2

Basic characteristics to be furnished in frequency assignment or allotment notices for earth and/or space stations which operate in the fixed satellite service providing feeder links to space stations in the broadcasting satellite service.[1,2]

---

1. The following information is required in notices relating to receiving space stations:

1.1 Country and IFRB Number
1.2 Notified orbital position (in degrees from the Greenwich Meridian)
1.3 Assigned/alloted frequency or channel number
1.4 Assigned/alloted frequency band
1.5 Date of bringing into use
1.6 Identity of the space station
1.7 Service area[3] (if necessary, the service area may be defined by a number of 'test points')
1.8 Geographical coordinates of the nominal intersection of the antenna beam axis with the earth.
1.9 Rain climatic zone(s) within the service area
1.10 Class of station
1.11 Class of emission and necessary bandwidth
1.12 Receiver system noise temperature referenced to the output of the antenna
1.13 Range of automatic gain control (if used)
1.14 Antenna characteristics:
- gain of the antenna referred to an isotropic radiator,
- shape of the beam (elliptical, circular or other),
- Δ G (difference between the maximum gain and the gain in the direction of a point in the service area at which the power flux density is at a minimum),
- pointing accuracy,
- type of polarization,
- sense of polarization,
- rotation accuracy for elliptical beams,
- orientation of elliptical beams,
- major axis (degrees) at -3 dB point,
- minor axis (degrees) at -3 dB point,
- co-polar and cross-polar radiation patterns
- for other than elliptical or circularly shaped beams indicate the maximum gain of the space station receiving antenna and the gain contours plotted on a map of the Earth's surface, preferably in a radial projection from the satellite on to a plane perpendicular to the axis from the centre of the Earth to the satellite. The isotropic or absolute gain at each contour which corresponds to a gain of 2,4,6,10 and 20 dB and at 10 dB intervals thereafter, as necessary, below the maximum gain, shall be indicated. The co-polar and cross-polar gain contours of the space station receiving antenna should also be provided in the form of a numerical equation or in tabular form to facilitate computer analysis.

---

[1] This annex is restricted to notices in the 17.3 - 17.8 GHz band.
[2] Notices relating to space stations and earth stations used for telecommand purposes associated with the Plan shall be furnished in accordance with Appendix 3 of the Radio Regulations.
[3] In the 17.7-17.8 GHz band, specific transmitting earth station coordinates must be given.

ANNEX 2 (cont'd)

1.15 Station keeping accuracy
1.16 Minimum angle of elevation in the service area
1.17 Modulation characteristics:
- type of modulation,
- pre-emphasis characteristics,
- TV system,
- sound broadcasting characteristics,
- frequency deviation,
- composition of the baseband,
- type of multiplexing of the video and sound signals,
- energy dispersal characteristics (if used),
1.18 Hours of operation (UTC)
1.19 Coordination
1.20 Agreements
1.21 Other Information
1.22 Operating administration or company

2. The following information is required in notices relating to transmitting earth stations:

2.1 Country and IFRB number
2.2 Assigned/alloted frequency or channel number
2.3 Assigned/alloted frequency band
2.4 Date of bringing into use
2.5 Identity, location[1] or area of operation of the transmitting earth station
2.6 Space station with which communication is to be established
2.7 Power characteristics of the transmission
- peak envelope power (dBW) supplied to the antenna,
- maximum power density per Hz (dB(W/Hz)), averaged over the worst 1 MHz band, supplied to the antenna,
- power control characteristics (if used),
- site diversity characteristics (if used),
2.8 Class of emission, necessary bandwidth and description of transmission
2.9 Modulation characteristics
- type of modulation
- pre-emphasis characteristics
- TV system
- sound broadcasting characteristics
- frequency deviation
- composition of the baseband
- type of multiplexing of the video and sound signals
- energy dispersal characteristics (if used),
2.10 Transmitting antenna characteristics:
- main-beam gain (dBi)
- beamwidth in degrees between the half-power points (describe in detail if not symetrical)
- the measured radiation diagram of the antenna (taking as a reference the direction of maximum radiation), or the reference radiation diagram to be used for coordination
- type of polarization
- sense of polarization

---

[1]This information is required for frequency assignments in the band 17.7-17.8 GHz

ANNEX 2 (cont'd)

- the horizon elevation angle[1] in degrees for each azimuth around the earth station
- altitude[1] of the antenna above mean sea level

2.11 Hours of operation (UTC)
2.12 Coordination
2.13 Agreements
2.14 Other information
2.15 Operating administration or company.

---

[1]This information is required for frequency assignments in the band 17.7-17.8 GHz.

ANNEX 3

Coordination between stations in the Fixed Satellite Service (Space-to-Earth) and feederlink stations in the Plan in the band 17.7-17.8 GHz (See Article 6)

(Detailed proposal will be provided in subsequent Canadian proposals. This annex will describe when coordination is required and how to calculate it in various situations).

ANNEX 4

Coordination of earth stations and space stations providing feeder links, with stations in the terrestrial Fixed and Mobile Services (See Article 6)

1. With respect to 4.3.1.3 of this Appendix, a feeder link earth station shall be co-ordinated with terrestrial stations of another Administration which are within the coordination area calculated by the procedures of Appendix 28 of the Radio Regulations, in the situation where:

   (1) the necessary bandwidth of the proposed frequency assignment(s) of the feeder link earth station falls in whole, or in part, in the 17.7-17.8 GHz band; and

   (2) the proposed location is not one of those specifically identified in Article 8 of this Appendix.

   Reason: The band 17.7-17.8 GHz is shared by the FSS (earth-to-space) with terrestrial services in Region 2 and hence, the coordination procedures of Appendix 28 would apply. Administrations will be able to identify the probability of receiving interference from those feederlink earth stations specifically identified in the Plan in this band. It would seem unnecessary to regulate such coordination. On the other hand, addition of a new feeder link earth station beyond those identified in the original plan must be coordinated with the terrestrial services of another administration to the extent defined by the coordination area of Appendix 28.

2. Interference into feeder link space stations from terrestrial stations.

   To overcome a significant probability of interference into the space station receiver of a feeder link from terrestrial stations pointed at or near the geostationary satellite orbit, the calculated power flux density at any position on the orbit shall not exceed -121 dB (W/m^2. 24 MHz) calculated using the equation:

ANNEX 4 (cont'd)

$$pfd = E_t - 148.5 - 10 \log B_t - L_{ca}$$

where pfd = calculated power flux density at the geostationary satellite orbit (dB (W/m^2. 24 MHz)) which is to be compared to the value -121 dB (W/m^2. 24 MHz)

E_t = e.i.r.p. of the terrestrial transmitter in the direction of the orbit (dB)

B_t = RF bandwidth of the terrestrial transmitter in MHz if greater than 24 MHz; otherwise, B_t is to be assumed equal to 24 MHz for the purpose of this calculation.

L_{ca} = clear air attentuation loss (dB)

Reason: To ensure that interference to the feeder link is at a sufficiently low level to have a minimum impact on the Plan. The CCIR/CPM report (section 7.5.3.1) recognizes that there is need to re-examine the question of orbit avoidance by terrestrial transmitters sharing this band. However, specifying a permissible pfd at the orbit is considered preferable to a general restriction on pointing at the orbit as is currently required in shared bands below 15 GHz. The pfd approach provides the terrestrial services operators with more flexability in achieving the same goal, ie. meeting a minimum C/I at the space station receiver. See Attachment A to this Annex for further analysis. See also Article 27 of the Radio Regulations (para. 2511 and 2511.1) as well as Resolution 101.

Attachment A to ANNEX 4 , Appendix 30A *

Protection of Feeder Link Space Stations from Stations in the Fixed Service in the Band 17.7-17.8 GHz

1. Introduction

This background paper derives power flux density criteria for the protection of feeder link space stations from stations in the Fixed Service in the 17.7-17.8 GHz band.

2. Assumptions

The following assumptions are made:

(a) The terrestrial system uses digital modulation and hence the interference is noise-like;

(b) The feeder link earth station parameters based upon the technical annexes are as follows:

- transmitter power P_T = 30 dBW
- minimum antenna diameter = 5 meter
- antenna gain G_E at 55% efficiency = 56.7 dB
- CCIR atmospheric absorption model as in Rep.719-1
- Country-wide feeder links are assumed to be at the -3dB points on the antenna coverage pattern
- maximum rain fade of 10 dB for 99% worst month (wm)
- $(C/N)_{TOT}$ = 12 dB, and $(C/N)_{DN}$ of 12.5 dB (both 99% worst month)

(c) The polarization of the terrestrial system is assumed to be linear and feeder link circular, therefore only 3 dB discrimination would be available.

3. Protection Criteria

The total carrier-to-noise ratio, $(C/N)_{TOT}$, and the uplink contribution which consists of thermal noise and interference can be calculated in the following fashion:

$$\left(\frac{C}{N}\right)_{TOT} = \left(\frac{C}{N}\right)_{UP} \oplus \left(\frac{C}{N}\right)_{DN}$$

$$\left(\frac{C}{N}\right)_{UP} = \left(\frac{C}{N_{TH}}\right)_{UP} \oplus \left(\frac{C}{I}\right)_{UP}$$

where $\oplus$ denotes power addition
$(C/N)_{UP}$ is feeder link carrier to noise ratio
$(C/N)_{DN}$ is downlink carrier-to-noise ratio
$(C/N_{TM})_{UP}$ is the thermal noise component of the feeder link C/N
$(C/I)_{UP}$ is the feeder link carrier-to-interference ratio

---

* This background paper is provided for information only and should not be included in this Appendix.

In order that degradation of the feeder link C/N due to interference be restricted to 0.5 dB, and allowing 3 dB for multiple entry, the following

$$\left(\frac{C}{I}\right)_{UP} = \left(\frac{C}{N_{TH}}\right)_{UP} + 10 + 3 \text{ dB} = \left(\frac{C}{N_{TH}}\right)_{UP} + 13 \text{ dB}$$

In addition, if the value of $(C/N_{TH})_{UP}$ cannot contribute more than 0.5 dB to the overall $(C/N)_{TOT}$, i.e. $\left(\frac{C}{N_{TH}}\right)_{UP} = \left(\frac{C}{N}\right)_{DN} + 10\text{dB}$; then $\left(\frac{C}{I}\right)_{UP} = \left(\frac{C}{N}\right)_{DN} + 23$ dB

Hence, the value of $\frac{C}{N_{UP}}$ to be used in the analysis is 35.5 dB for 99% worst month for a $(C/N)_{DN}$ of 12.5 dB (1)

It is desirable to express the levels of orbital protection in terms of power flux density (pfd). The wanted and unwanted pfd's are given by:

$$P_W = C - G_S(\phi_o) + G_1$$
$$P_I = I - G_S(\phi_S) + G_1 + L_P$$

thus $$P_I = P_W - (C/I) + G_S(\phi_o) - G_S(\phi_S) + L_P \qquad (2)$$

where $G_S(\phi)$ = space station antenna gain in the direction of the Fixed Station

$$= G_o - 12\left(\frac{\phi_S}{\phi_o}\right)^2 \qquad \left(\text{for } \frac{\phi_S}{\phi_o} \text{ less than } 1.58\right)$$

G_o = space station antenna gain, dBi
G_1 = Gain of a unit (1^2) antenna at 17 GHz = 46.5 dBi
ϕ_o = Space station antenna half-power beamwidth
ϕ_s = Angle subtended at the satellite by the boresight and the Fixed Station
L_P = polarization discrimination 3 dB

The pfd of the wanted signal at the space station is given by:

$$P_W = P_T + G_E - L_F - L_A - L_R + G_I$$

where L_F is the path loss (208.5 dB), L_A is the atmospheric absorption loss per Report 719-1 (0.25 dB) and L_R is the rain margin for 99% worst month (assumed 10 dB). P_T = 30 dBW and G_E = 56.5 dB are the earth station power and antenna gain respectively.

This yields:

P_W = -85.6 dB(W/m^2) for 99% worst month

From equation (2), the maximum interference pdf is:

$$P_I = 121.1 + 12\left(\frac{\phi_S}{\phi_o}\right)^2 \qquad \text{dB}(W/m^2) \qquad (3)$$

The satellite angle ϕ_s can be shown geometrically to be greater than 0.52 degrees with a boresight whose elevation angle is 20 deg. and a fixed station of 0 degree elevation. In order to accommodate country-wide feeder links, assume $\phi_o = 5^o$. Then permissible pfd is:

$$P_I = -121 \text{ dB}(W/m^2) \qquad (4)$$

3. Impact on Terrestrial Systems

Article 27 of the Radio Regulations permits a maximum e.i.r.p. of 55 dBW with a maximum antenna input power of 10 dBW for terrestrial systems in shared bands. This would produce a clear-air pfd at the orbit of -111 dB(W/m^2) over an r.f. channel bandwidth, including a conservative 4 dB loss due to atmospheric gases. Therefore, to meet the criteria established in section 2 above, the terrestrial station must provide 10 dB descrimination. This can be readily obtained in practice because systems will use lower power or have wide bandwidths than that used these calculations. Failing this, a 0.8 degree orbital avoidance will be required.

4. Method of Regulation

A key element in the BSS plan is flexibility. Thus, although -121 dBW/m^2 could be used as a trigger level for coordination, any excessive pfd would preclude further changes. Therefore, a general orbital protection formula is required. Strict adherence to orbital avoidance of 0.8 to 1 degree, in the manner of Article 27 for the bands below 15 GHz is not warranted largely because the portion of the band affected is only a small part of the total bandwidth used by the fixed station. Therefore, it is recommended that the most suitable means for orbital protection in this case is the specification of a maximum pfd.

The appropriate limit of power flux density at the geostationary orbit due to a terrestrial fixed or mobile station, has been shown to be -121 dB(W/m^2 . 24 MHz).

ANNEX 5

Technical Data required in establishing the feeder link provisions and associated Plan

1. Definitions

1.1 Overall protection margin

The combined values of equivalent co-channel protection margin for both the space-to-earth path and the earth-to-space (feeder link) path for all interfering sources in the plan including interference from other channels in the same service area.

Note: The equivalent protection margins are calculated independantly for the feeder links and for the downlinks in a manner described in Section 3.4 of Annex 8 of Appendix 30 and power added to calculate the overall equivalent protection margin for the feeder link and downlink combined.

1.2 Feeder link

A radio link in the Fixed-Satellite Service from a transmitting earth station to a receiving space station for connection to a planned broadcasting satellite at 12 GHz. For Region 2, the feeder links are in the band 17.3 to 17.8 GHz and are associated with the broadcasting satellite plan in the band 12.2 to 12.7 GHz.

1.3 Feeder link service area

The area on the surface of the Earth in which the administration responsible for the service has the right to locate transmitting earth stations for the purpose of providing feeder links to broadcasting satellite space stations.

1.4 Feeder link beam area

The area delineated by the intersection of the half-gain beamwidth of the satellite receive antenna with the surface of the Earth.

1.5 Feeder link earth station

A transmitting earth station in the Fixed-Satellite Service operating in the band 17.3 - 17.8 GHz.

1.6 Translation Frequency

The difference between the assigned/alloted frequency in the feeder link plan and the corresponding assigned frequency in the downlink plan.

2. Polarization

Feeder links to broadcasting satellites in Region 2 use circular polarization. The sense of polarization is defined in Section 3.2.3 of Annex 8 of Appendix 30.

ANNEX 5 (cont'd)

3. Translation Frequency

The translation frequency between the feeder link plan and the downlink plan is equal to 5.1 GHz.

4. Nominal Orbital Position of a Space Station

(Note: Text to be provided in subsequent Canadian proposals highlighting the need in some cases for a 0.4 degree separation of space stations receiving cross- polarized adjacent channels from the same or adjacent service areas. The proposal will indicate how this requirement can be incorporated into the planning).

5. Propagation Factors

5.1 Attenuation

The feeder link plan is based on a propagation loss on an earth-space path which is equal to the free space path loss plus the atmospheric absorption loss plus the rain attenuation, the latter two exceeded for 1% of the worst month.

The loss due to absorption and rain attentuation can be calculated using the methods given to Section 2.4 of Annex 8 of Appendix 30. Figure 5.1 presents plots of rain attenuation of circularly polarized signals exceeded for 1% of the worst month of 17.5 GHz, as a function of earth station latitude and elevation angle for each of the rain climates represented by Region 2.

5.2 Depolarization

Rain and ice can cause depolarization of radio frequency signals. The level of the co-polar component relative to the depolarized component is given by the cross-polarization discrimination (XPD) ratio. For the feeder link, the XPD ratio, in dB, not exceeded for 1% of the worst month is given by:

$$XPD = 37.4 - 23 \log A_p - 40 \log(\cos\theta) \quad dB, \quad (5^\circ \leq \theta \leq 60^\circ) \qquad (5.2)$$

where A_p is the co-polar rain attenuation exeeded for 1% of the worst month, and θ is the elevation angle. For values of θ greater than 60°, use $\theta = 60^\circ$ in equation (5.2).

Source: CCIR/CPM report, section 3.2.6

6. Methods to guard against the effect of rain attenuation and depolarization on feeder links

Techniques such as the control of power at the feeder link earth station, the automatic control of the transponder gain on-board space stations, the use of site diversity for feeder link earth stations and the compensation of depolarization can reduce the effect of rain on feeder links. These techniques can only be used in the plan under the conditions given in the following subsections.

Reason: To maintain the feeder link contribution of about 0.5 dB of the overall noise of the satellite link for 99% of the worst month, to maintain the output of the satellite transponder within 0.5 dB of saturation for 99% of the worst month, and to maintain the level of interference to other feeder links to within 0.5 dB of the levels calculated in the plan.

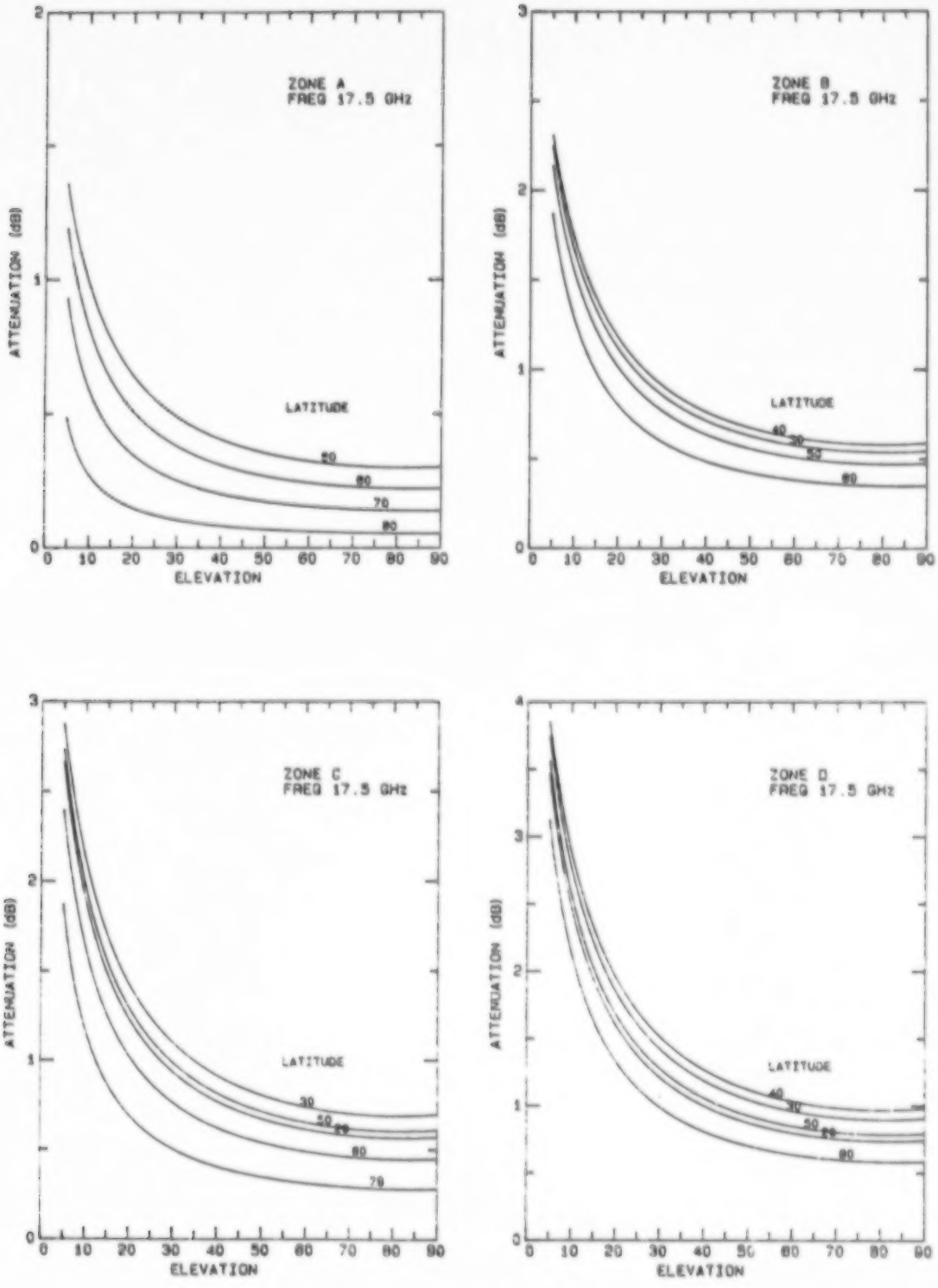
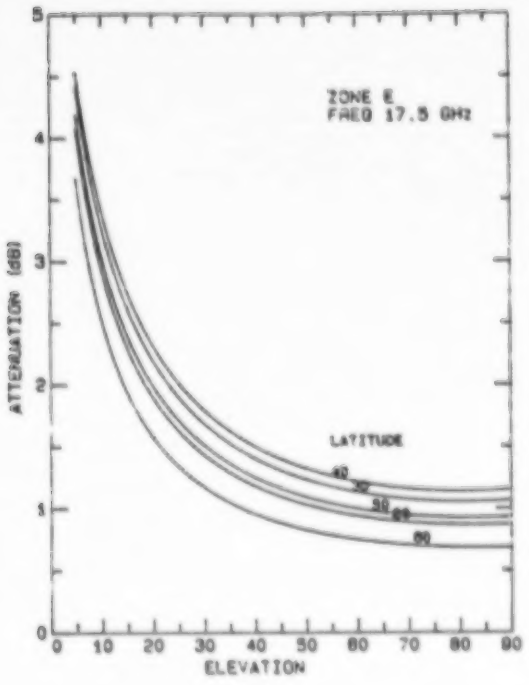
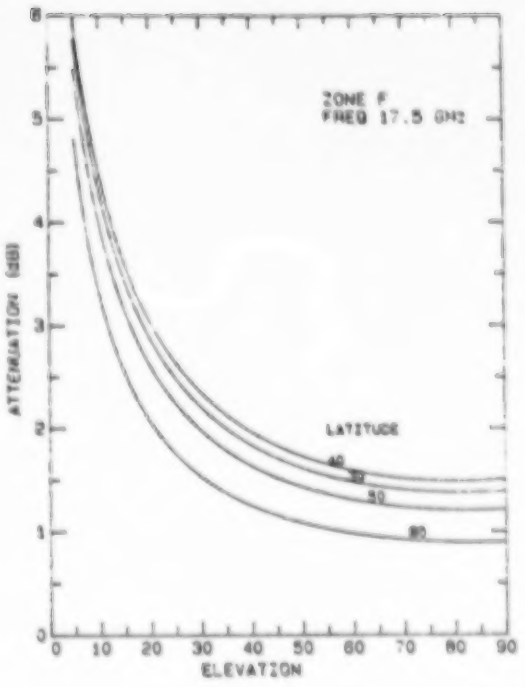
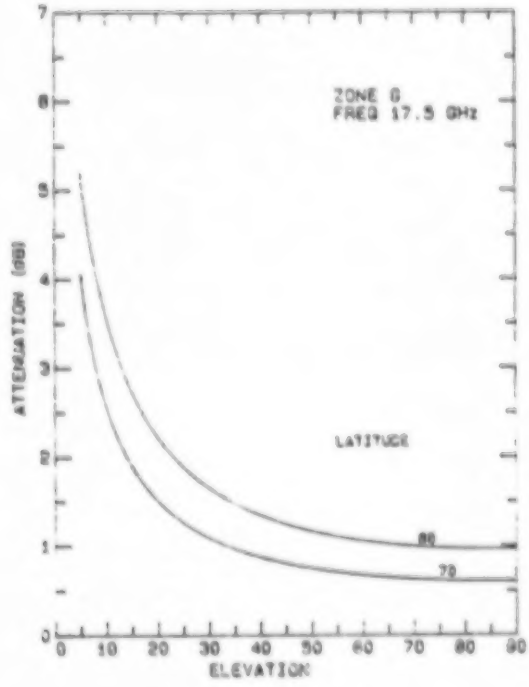


FIGURE 5.1 Rain attenuation, A_p, for the rain climatic zones of Region 2 as a function of latitude and elevation angle. (Circular polarization, 1% of the worst month at 17.5 GHz).







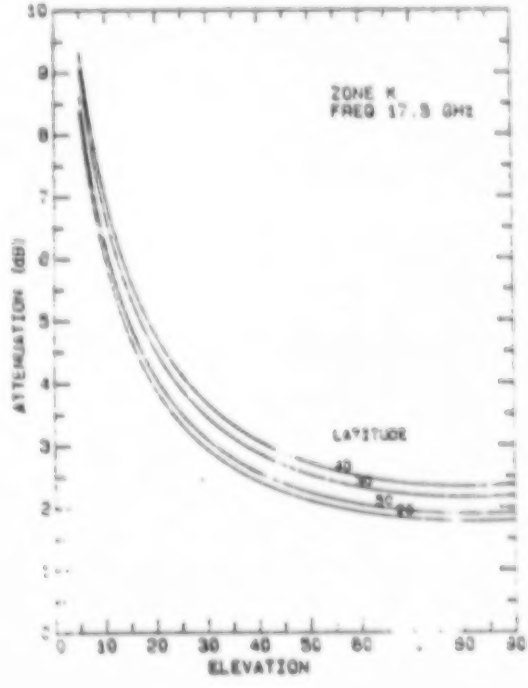
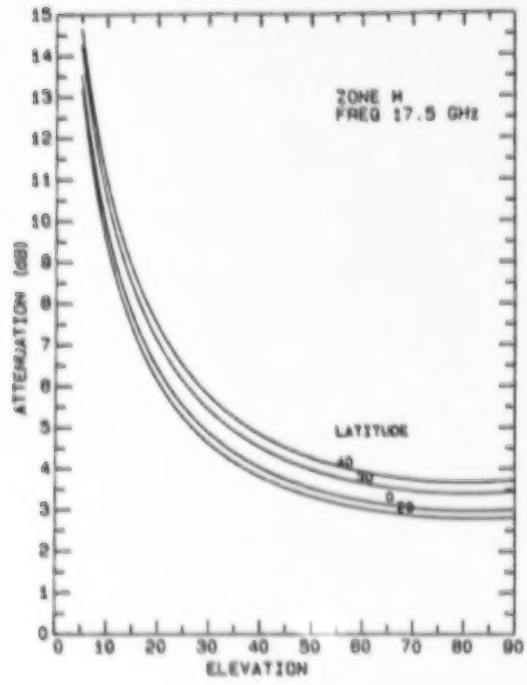
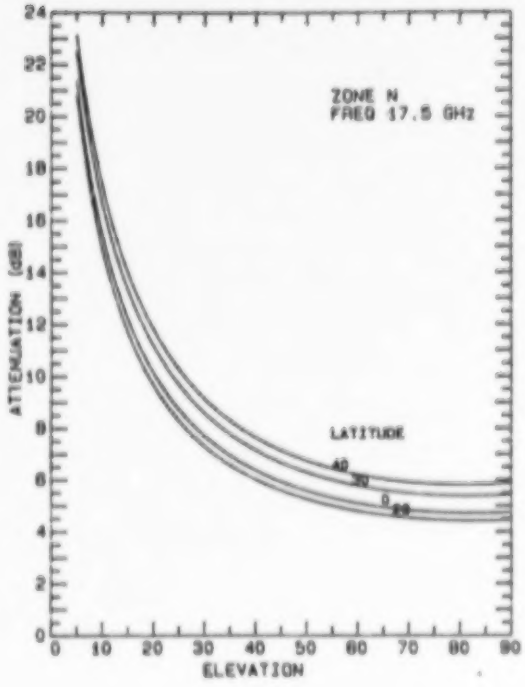


FIGURE 5.1 (Continued)





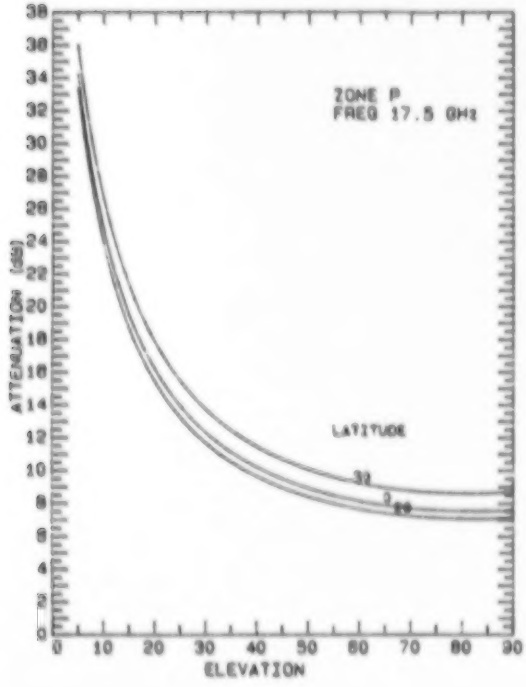


FIGURE 5.1 (Continued)

ANNEX 5 (cont'd)

6.1. Power Control

The maximum peak envelope radio frequency power delivered to the input of the antenna of the feeder link earth station shall be equal to 1000 watts per channel. The use of power levels higher than the planned maximum value is only permitted during rain at earth stations having an elevation angle greater than 40 degrees. For such feeder link earth stations, the transmitted power can exceed the planned maximum during rain in a manner which is proportional to the instantaneous rain attenuation at 17 GHz up to a maximum exceedance indicated in Table 6.1

Elevation Angle of Feeder Link Earth Station Antennas	Transmitted Power Permitted in Excess of 1000 Watts During Rain
0° to 40°	0 dB
40° to 50°	2 dB
50° to 60°	3 dB
60° to 90°	5 dB

Table 6.1: Transmitted radio frequency power of the feeder link earth station permitted in excess of 1000 Watts during rain as a function of elevation angle.

Reason: To facilitate the planning and operation of feeder links in tropical rain climatic zones.

6.2 Automatic gain control

The range of automatic gain control permitted on-board a space station or co-located space stations transmitting cross-polarized adjacent channels to the same or adjacent downlink service areas is limited to a maximum of 15 dB. This limit does not apply to space stations other than this type of space station or for space stations transmitting cross-polarized, adjacent channels to the same or adjacent service areas when these space stations are nominally separated by more than 0.4 degrees on the geostationary orbit.

Reason: The use of automatic gain control on-board space stations permits the operation of the satellite transponder close to saturation. However, under certain conditions, automatic gain control may cause an overamplification of the adjacent cross-polarized channel on the downlink resulting in levels of downlink interference higher than the planned values. The 15 dB limit is a guard against this effect.

6.3 Site Diversity

Site diversity refers to the alternate use during rain of two or more transmitting earth stations which may be separated by a distance larger than about 10 km. There is no restriction on the use of site diversity in the plan.

Reason: These interconnected earth station may permit greater availability of the wanted feeder link carrier-to-noise ratio and generally result in lower levels of interference to other feeder links than those calculated in the plan. Although the use of site diversity is not considered in the development of the feeder link plan, this technique is permitted in the plan and may be found advantageous under certain conditions of rain climatic zone, elevation angle and latitude of the earth station where the corresponding rain attenuation at 17 GHz exceeds 5dB at each site.

ANNEX 5 (cont'd)

6.4 Depolarization Compensation

Rain and ice can cause depolarization of the radio frequency signals. Techniques have been developed to compensate for this effect either at the transmitting feeder link earth station or at the space station receiver. The use of these techniques without coordination is not permitted in the plan if the technique used would cause an increase of the level of interference of more than 0.5 dB relative to that calculated in the feeder link plan.

7. Technical characteristics of feeder link earth stations

7.1 Earth station location

In the frequency band 17.3 - 17.7 GHz, the feeder link earth stations can be located anywhere inside the feeder link service area.

In the frequency band 17.7 - 17.8 GHz, the feeder link earth stations can be located at any location which is specified in the plan. Other locations can be used provided they are coordinated with other services sharing the same band. The coordination procedures are given in Article 6 of this Appendix.

7.2 Feeder link service area

The planning of feeder links is based on a feeder link service area which is defined by a number of specified points located on or inside its contour. These specified points may or may not correspond to those specified in the downlink plan and therefore the feeder link service area may differ from that of the corresponding downlink service area.

7.3 Diameter of feeder link earth stations antennas

Planning of feeder links to space stations of the broadcasting-satellite service is based on a diameter of feeder link earth station antenna equal to 5 m and an antenna efficiency of 55% which corresponds to a maximum gain of the antenna of 56.6 dB at 17.5 GHz. Larger earth station antennas can be used subject to coordination with any other frequency assignment to a space station located within +/- 0.8 degrees of the orbital assignment of the administration which considers the use of the larger earth stations.

The minimum diameter of earth station antennas which can be used in the plan is 2.5 m. The carrier-to-noise ratio and the wanted carrier-to-interference ratio resulting from the use of the small, earth station antennas are generally less than those calculated in the feeder link plan. The feeder link carrier-to-noise and carrier-to-interference performance is degraded by 6 dB for the minimum earth station antenna compared to the 5 m antenna.

7.4 Transmitted power of the feeder link earth station

The maximum peak envelope power delivered to the input of the antenna of the feeder link earth station is equal to 1000 watts.

This level of power can be exceeded under certain conditions specified in Section 6.1 of this Annex.

ANNEX 3 (cont'd)

7.5 Equivalent isotropically radiated power

The feeder link plan is based on an e.i.r.p. of 86.6 dBW for the feeder link earth stations calculated for a 5 m antenna and 1000 watts of transmitted power, with an antenna efficiency of 55%.

7.6 Earth station antenna reference radiation patterns

The reference radiation patterns of feeder link earth station antennas are given in Figure 7.6 for the co-polar gain and the cross-polar gain.

7.6.1 Co-polar gain

The co-polar reference radiation pattern, in dBi, is:

$36 - 20 \log_{10} \phi$	dBi	for $0.1° \leq \phi <$	$0.32°$
$51.3 - 53.44 \phi^2$	dBi	for $0.32° \leq \phi <$	$0.54°$
$29 - 25 \log_{10} \phi$	dBi	for $0.54° \leq \phi <$	$36°$
-10 dBi		for $36° \leq \phi$	

where ϕ is the off-axis angle in degrees

In the angular range between 0.1 and 0.54 degrees, the co-polar gain is assumed not exceed the reference pattern. At larger off-axis angles, any co-polar sidelobe peak must not exceed the reference pattern by more than 5 dB and at least 90% of all sidelobe peaks in each of the reference angular windows must be below the reference pattern. The reference windows are 0.54° to 1°, 1° to 2°, 2° to 4°, 4° to 7°, 7° to 10°, 10° to 20°, 20° to 40°, 40° to 70°, 70° to 100° and 100° to 180°.

7.6.2 Cross-polar gain

The cross-polar reference radiation pattern, in dBi, is:

G_{max} - 30	dBi	for	$\phi < 0.6/D°$
$9 - 20 \log_{10} \phi$	dBi	for	$0.6/D° < \phi < 8.7°$
- 10	dBi	for	$8.7° < \phi$

where:

D is the diameter in meters of the antenna used,
G_{max} is the on-axis co-polar gain in dBi of the antenna used and is given by:

$$G_{max} = 45.3 + 20 \log_{10} D + 10 \log_{10} \eta \text{ dBi, and}$$

η is the antenna efficiency

In the angular range between zero and 0.6/D degrees, the cross-polar gain must not exceed the reference pattern. At larger off-axis angles, any cross-polar sidelobe peak must not exceed the reference pattern by more than 5 dB and at least 90% of all sidelobe peaks in each of the reference angular window must be below the reference pattern. The reference windows are: 0.6/D to 1°, 1° to 2°, 2° to 4°, 4° to 7°, 7° to 10°, 10° to 20°, 20° to 40°, 40° to 70°, 70° to 100°, and 100° to 180°.

ANNEX 5 (cont'd)

8. Technical characteristics of satellite receiving antenna

8.1 Feeder link beam area

The maximum size of the half-gain beamwidth of the satellite receiving antenna is a circle or ellipse which includes all specified points of the feeder link service area or 0.6 degrees, whichever is the larger.

Reason: 0.6 degrees half-gain beamwidth corresponds to a 2 m antenna diameter at 17.5 GHz.

8.2 System noise temperature and figure of merit (G/T)

Planning of feeder links to space stations of the Broadcasting-Satellite Service is based on a system noise temperature of 1500 K for the satellite receiver. In Region 2, the range of interest of the satellite receive antenna gain at the edge of the beam area varies from about 28 dB for a large country-wide feeder link beam of 3 degrees by 8 degrees to 46 dB for a small spot beam of 0.6 degrees diameter. The corresponding range of interest of G/T of the satellite receive antenna at the edge of the beam varies from -4 dB(K^{-1}) to 14 dB(K^{-1}).

8.3 Beam pointing tolerance and angular rotation tolerance

The plan is based on a pointing tolerance of the satellite receive antenna of 0.1 degree in any direction and on an angular rotation tolerance of the satellite receiving antenna beam about its axis of ± 1 degrees; this latter tolerance does not apply to beams of circular cross section using circular polarization.

8.4 Reference radiation pattern for the satellite receiving antenna

(To be provided in subsequent Canadian proposals).

9. Carrier-to-noise ratio

As guidance in the development of the feeder link plan for Region 2, the feeder link contribution to the overall noise budget, calculated by the power addition of feeder link noise and downlink noise, should be less than 0.5 dB for 99% of the worst month.

The evaluation of the plan in Region 2 is based on the overall carrier-to-noise ratio exceeded for 99% of the worst month and not on the feeder link contribution or the downlink contribution separately.

These calculations are based on the assumptions that rain events are correlated at the feeder link and downlink sites and that automatic gain control is operated on-board the space station receiver in a manner prescribed in Section 6.2 of this Annex.

ANNEX 5 (cont'd)

10. Carrier-to-interference ratio

As guidance in the development of the feeder link plan for Region 2, the feeder link contribution to the overall interference budget, calculated by the power addition of feeder link interference and downlink interference, should be less than 0.5 dB for 99% of the worst month.

The evaluation of the plan in Region 2 is based on the overall protection margin exceeded for 99% of the worst month and not on the feeder link contribution or the downlink contribution separately.

These calculations are based on the following assumptions:

a) that rain events are correlated at the feeder link site and downlink site,

b) that automatic gain control is operated on-board the satellite receiver in a manner prescribed in Section 6.2 of this Annex,

c) that satellites transmitting cross-polarized adjacent channels to the same or adjacent service areas are nominally separated by a minimum of 0.4 degrees on the geostationary satellite orbit,

d) that the most likely worst case condition exists, that is, the wanted feeder link is attenuated by rain while the interfering feeder links are not.

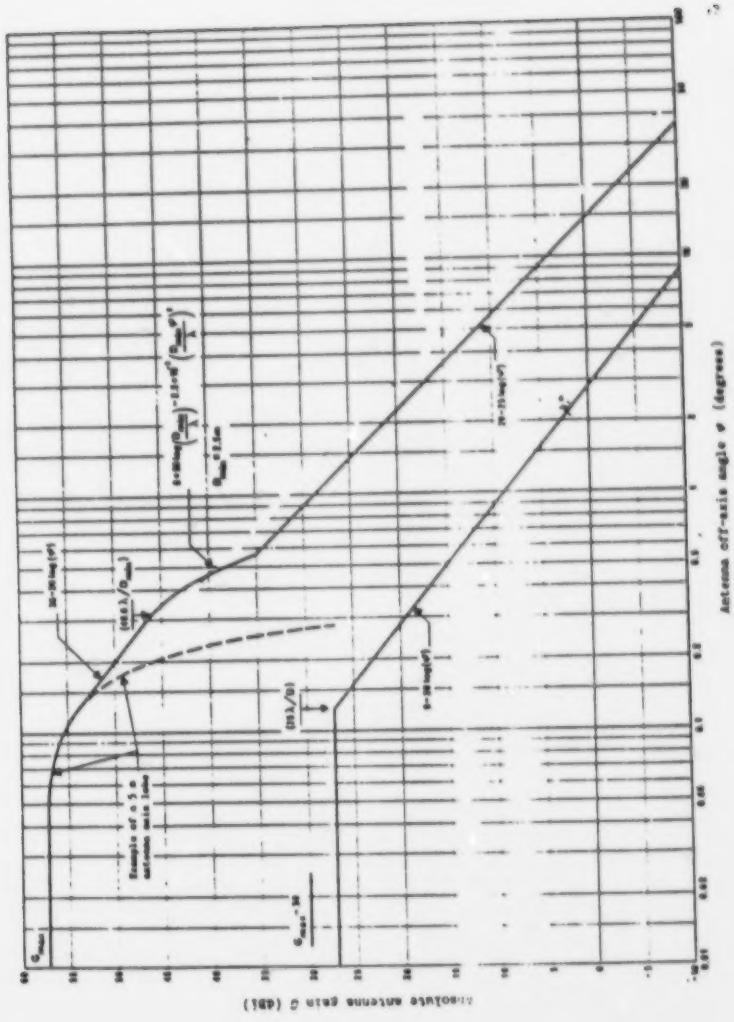


Figure 7.6 - Reference radiation patterns for feeder link earth stations.

PART IV

RESOLUTIONS

ADD

RESOLUTION A

Relating to the annexing to the Radio Regulations of the provisions and associated Plans contained in the Final Acts of the Conference for Region 2

The Regional Broadcasting-Satellite Administrative Radio Conference in Region 2, Geneva, 1983,

considering

a) that its Final Acts will come into force on 1 January, 1985;

b) that the Plenipotentiary Conference, Nairobi, 1982, in its Resolution No. PLA/5, decided that the formal adoption, for inclusion in the Radio Regulations, of the decisions of the 1983 Regional Administrative Conference for the planning of the Broadcasting-Satellite Service in Region 2, be under the purview of the First Session of the World Administrative Radio Conference on the Geostationary-Satellite Orbit and the Planning of Space Services Utilizing It (June-August 1985);

c) that there will be an interim period between the date of entry into force of these Final Acts and the date on which the provisions and associated Plan for Region 2 are annexed to the Radio Regulations;

d) that notwithstanding the provisions of No. 47 of the Convention (Malaga-Torremolinos, 1973), the World Administrative Radio Conference, Geneva, 1979, has recognized that its decisions including matters of interregional sharing contained in Resolution No. 31 and 700 need to be taken into account by the Regional Broadcasting-Satellite Administrative Radio Conference;

further considering

that upon adoption and inclusion in the Radio Regulations by the First session of the World Administrative Radio Conference on the Use of the Geostationary-Satellite Orbit and the Planning of Space Service Utilizing It, of the Final Acts of this Conference, these Final Acts will complete a World Agreement and associated Plans;

resolves

1. that during this interim period, these Final Acts shall be considered as a Regional Agreement;

2. that upon the formal adoption and inclusion in the Radio Regulations of these Final Acts, Article 13 of Appendix 30 shall include Region 2 within its text.

3. that both during this interim period and after the date on which they have been annexed to the Radio Regulations, the provisions and the associated Region 2 Plan shall retain their integrity as a legal instrument;

4. that during this period the IFRB and the other appropriate organs of the Union shall be guided by the provisions of these Final Acts and the Radio Regulations.

ADD

RESOLUTION B

Relating to the updating of the Master International Frequency Register for Region 2 on the date of entry into force of the Final Acts

The Regional Broadcasting-Satellite Administrative Radio Conference in Region 2, Geneva, 1983,

considering

a) that, the World Broadcasting-Satellite Administrative Radio Conference, Geneva, 1977, in Resolution No. Sat-2, resolved that on the date of entry into force of the Final Acts of that Conference, the frequency assignments in the Plan for Regions 1 and 3 will be entered in the Master Register;

b) that, the date of signature of these Final Acts will also be entered;

c) that, Resolution No. Sat-2 was abrograted by the World Administrative Radio Conference, Geneva, 1979 on the understanding that the provisions of that Resolution were complied with;

resolves

that, on the date of entry into force of the Final Acts of the Regional Broadcasting-Satellite Conference for Region 2 Geneva, 1983 the frequency assignments in the Region 2 Plan and the date of signature of these Final Acts will be entered in the Master Register;

invites the IFRB

to take the necessary action to implement the provisions of this Resolution.

SUP Resolution 31, 504, 700 and 701

Reason: There is no need to retain these resolutions after the RARC since they will have been taken into account by the Conference.